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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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SEMINAR ON

ACHIEVING COMPETITIVE QUALITY THROUGH STANDARDIZATION AND IMPLEMENTING QUALITY SYSTEM

Sponsored by
United Nations Industrial Development Organization (UNIDO)
and
Ministry of International Trade and Industry (MITI), Japan

Hosted by
Dewan Standardisasi Nasional (DSN)
(Standardization Council of Indonesia)

Organized by
Japanese Standards Association (JSA)

26th – 28th, January 1993
The Borobudur Inter . Continental Jakarta

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Keynote Address

Current Situation and Prospect of Standardization by Government in Japan

by Tamotsu MUKAI
Director-General,
Standards Department,
AIST, MITI

Introduction

Good morning, everyone.

I would like to thank you for joining this seminar by UNIDO today. The purpose of this seminar is to promote and enhance the industrial standardization and quality control in Asian countries. The first seminar was held in Bangkok, Thailand, in January, 1990, the second was held in Kuala Lumpur, Malaysia, in October, 1991 and this meeting today is the third. Recognizing the importance of this seminar in the Asian area, the Japanese government aids UNIDO with overall assistance, including financial aid and the dispatching of instructors.

In the next three days, we have a chance to hear about the reports regarding the current activities on industrial standardization and quality control and their effects on industrialization by both Japanese and Indonesian specialists with experience in each field. We will also have a panel discussion on these subjects by specialists from six countries, including Malaysia, the Philippines, Singapore and Thailand. Mr. Herudi, Head of Executive Council, and I have been asked to begin this seminar.

I will now describe the future direction of industrial standardization in Japan.

1. Outline of Industrial Standardization in Japan

The industrial standardization administration is based on the Industrial Standardization Law which was enacted in June 1949 for the following purposes:

① to set up the Japanese Industrial Standards (JIS) as the technical specification to be used in production, distribution and consumption.

② to manage JIS Marking System to indicate conformance with the standards.

The actual work consists of the following:

a) to execute the necessary study and research for setting up the standards.

b) to draw up the draft of the standards.

c) to serve as the secretariat for the Japanese Industrial Standards Committee, (JISC), which is the committee to formulate the Japanese Industrial Standards (JIS).

For performing the industrial standardization administration, "The sectorial long-range plan for industrial standardization promotion" is set up every five years. The current plan, the seventh, was set up in May, 1991.

2. Development of JIS and Management of JIS Marking System

(1) Development of JIS

A total of ten ministries, including the Ministry of International Trade and Industry (MITI) and the Ministry of Transport, perform the industrial standardization administration. The competent ministers identify the items which require nationwide standards for the shape and size, quality, performance, production procedures, test procedures and so forth and the ministers decide to formulate as JIS standards according to JISC's recommendation.

Through the main purpose of JIS concerns activity such as the rationalization of production, smooth distribution and facilitating the spread of new technologies (new products) etc., recently, the efforts have been to formulate JIS concerning the progress of social welfare for the elderly, and environmental issues. These are, the so-called "Welfare JIS" and "Environmental JIS" with the background of a changing social structure and a diversity of values.

(2) Management of JIS Marking System

The competent ministers can designate the product among JIS-identified products as the subject of JIS Marking System. The products should be effective in protecting the consumer by maintaining safety, hygiene, and environmental protection.

When manufacturers receive the "permission" ("approval" for foreign manufactures) for JIS designated product from competent ministers for each factory, they can put the JIS mark on the products made in their specified factories.

The point of the recent JIS Marking System is that we have added examination items and criteria using JIS Z 9900 series (ISO 9000 series) to the examination items and criteria regarding the permission (approval) for JIS mark has been carried out since October, 1992. This is for international harmonization of the certification system.

Development of Japanese Industrial Standards: at the end of March 1992)

1) The total number of JIS standards 8,359
2) The number of designated products under JIS Marking System 959
3) The number of JIS permission or approval 16,178
4) The number of established standards in 1991 147
   The number of revised standards in 1991 446

Secondly, I will explain Japan's international activity in the field of industrial standardization.

3. Promoting International Standardization

The importance of international standardization is increasing today, and Japan is expected to contribute as much as possible to achieve the international standards on a worldwide basis. Also Japan is cooperating with developing countries regarding promotion of standardization, which contribute to the industrial development and the promotion of exports in respective countries.

(1) Contribution to ISO and IEC

JISC has the following directions for international standardization activities:

- to propose the drafts of international standards, especially in the field of new technology,
- to undertake as more as possible the role of secretariat of TC (Technical Committee), SC (Sub-Committee) and WG (Working Group), and
- to ensure the harmonization between international standards and JIS.

(2) Promoting Technical Cooperation with Developing Countries in the Field of Standardization

Utilizing existing cooperative schemes such as JICA, we are carrying out standardization assistance, such as technological assistance including dispatching experts and accepting trainees, equipment assistance and executing servey and study to promote standardization and quality control.

We have also provided a financial support for UNIDO since 1989, which, has enabled UNIDO to hold this seminar and other presentations, such as preparation of video materials regarding industrial standardization and quality control.

(3) JIS Marking System Opened to Foreign Countries

Japan has made the JIS Marking System open to foreign countries since 1980 for the purpose of equal treatment of foreign countries' products to domestic products, and to make it easier for them to compete in the Japanese market. Requests from foreign countries are recently increasing dramatically. We accept 20 – 30 applications each year.

The number of JIS approved foreign factories as of the end of 1991, Japanese fiscal year (JFY) is 210 factories in 17 countries with 29 cases approved in 1991 JFY.

4. Future Directions

Thirdly and finally, I will explain the future direction of industrial standardization administration of Japan.

As I've explained so far, the Standards Department of AIST, MITI has been executing the promotion of the domestic industrial standardization through development of JIS standards and management of JIS Marking System, and active participation in ISO and IEC, technical cooperation and assistance for developing countries in the field of industrial standardization and quality management. With a background of a changing social structure, deversity of values and an activation of international transactions, today's industrial standardization is expected more and more to play an important role.

The following should be emphasized to promote industrial standardization from now on:

(1) Promotion of Internationalization

International standardization has been recently activated with dramatic developments including the field of information technology and new materials.

Japan is ready to enact international standardization and to actively discharge its responsibility of international contribution in the fields of standardization.

Some of planned activities are the followings:

① Technical Cooperation on Standardization for Developing Countries

Feasibility study to establish an "ASEAN-Japan Standardization and Quality Control Network" as a new activity in 1993 in addition to the technical cooperation in the standardization activities of JICA and UNIDO.

② International Harmonization of Standards

Harmonization of JIS with international standards, based the "GATT Standards Code."

③ Active Participation in International Standardization Activities

Undertaking the role of secretariat for TC/SC in ISO and IEC, proposing new TC/SC, and submitting the drafts of international standards to the organization for setting up international standards.

(2) Establishment of an "Assessment and Registration Scheme of Quality Systems" based on the ISO 9000 series

Japan will develop the domestic assessment and registration scheme of quality systems based on the ISO 9000 series and in response to movements in other countries.

Especially we will establish a public foundation "Japanese Accreditation Association" [tentative title]) in early 1993.

(3) Efficient Implementation of JIS Marking System

By the end of 1991, 891 products have been identified as the designated products for JIS mark.

For making JIS Marking System more efficient, we are implementing effecticve examination based on JIS rules. At the same time, we would implement diligent study on the relation between the certification system in other countries and JIS Marking System.

(4) Promotion of Development of JIS

Although 8,359 JIS exist as of March 1992, the standards in which the content fails to match the current situation or which finish the role as national standards should be revised or abolished, in order to properly maintain the industrial standardization administration. Furthermore, changing social structure and diversification of values, request to develop the standards which people actually need.

(5) Consumer, Welfare and Environmental Issues

① Promoting "Personal Living and JIS"

We hold a "Special Committee on Personal Living and JIS" not only in Tokyo but also in local area such as in Nagoya and Hiroshima to learn the consumers' opinions about JIS administration.

② Environmental Management and Audit Scheme

As for the "Environmental Management and Audit Scheme", where discussion is progressing in the ISO/IEC/SAGE, we established a "Study Group on Environmental Management Standardization" within the Japanese Standards Association to cope with the issues quickly and properly. We also plans to actively participate in discussions in the newly established TC on environment at management.

③ Welfare Equipment

With an increase in the number of aged people and a support of handicapped people, it is necessary to provide safe and available welfare equipment. We are promoting standardization to facilitate the utilization of such equipment. The benefits are as follows:

- enhancing the life time of equipment and reliability by standardizing adaptation for the human body and testing and evaluating ways of developing durability.
- quick and economical provision of products offering the same functions and performance as order-made products by standardizing units or the parts/components.

(6) New Technological Fields

As for new technology, the role of industrial standardization is required such as "the function as a supporting base of technical development" by timely standardizing of testing and evaluation procedures, and "the function of promoting and popularization of new technology" by standardizing preceding products.

(7) Research and Development Concerning Standards

The important point in the standards' role is putting more emphasis on the issues of aged and the welfare society, environment and advanced technology, etc.

To respond to these issues properly, it is necessary to secure the base of standards for human-life, reference materials, earth environment, and systematization of information on advanced technology such as new materials.

As the first presenter, I've explained the present and future direction of industrial standardization in Japan.

Although it is really hard to carry out standardization and quality control timely and properly, I believe that everybody and every institute can directly benefit from it. I will now close my presentation and hope that this three-day seminar will be of great interest and help to you for promoting industrial standardization and quality control. I am now handing the microphone over to Mr. Herudi, Head of Executive Council, who has been helped us to hold this seminar with his great efforts.

Thank you very much for your kind attention.

(MEMO)

(MEMO)

1st day
Jan. 26 – 28, 1993

Keynote Address

Speaker: Mr. Herudi KARTOWISASTRO
Head of Executive Council/Secretary of DSN

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SESSION I: QUALITY MANAGEMENT

What are the Bases for Companywide Quality Control — An Overview —

by Dr. Yoshio Kondo
Professor Emeritus
Kyoto University

Abstract

Quality is the key to competitiveness in the opening global market. The special features of quality of longer history and of common concern between manufacturer and customer make it more compatible with human nature than cost and productivity. When quality is improved in a creative way, cost is reduced, and productivity is increased. In addition to improving "must-be" quality, providing "attractive" quality is indispensable for exploiting the way to customer satisfaction. By doing this, the growth of market due to synergetic effect can be anticipated. By following the cycle of plan-do-check-act, not only the result of the work but also the process itself are improved in an upward spiral. Inductive problem solving approach is being widely applied for the process improvement. Comparing the Japanese strategies with the lessons learned by the American companies which won the Malcolm Baldrige National Quality Award, it was revealed that the way leading to the world-class quality is very similar.

Introduction

It is evident that the present decade of the 1990s is a much more demanding era for quality than what we experienced throughout the 1980s. The reason is that the present momentum toward the globally open and competitive marketplace has unstoppable force which no government nor regional business consortium can delay indefinitely anymore, even if they were inclined to do so. This will mean an enormous increase in the competitive pressures upon most companies.

The present experiences of the international leadership companies demonstrate that quality is the key to competitiveness in the market, that without this quality leadership, any products and service do not travel under exclusive national passport, and that quality has become a fundamental way of managing any business anywhere for market growth and profitability. On the side of customers, it is an evident natural trend that their demand for quality continually increase along with the elevation of their living standard and educa-

tional level.

To cope with the competition in the global market, however, it is thought that not only the excellent quality but also the low cost of products and service and the high productivity of operations are the important and indispensable managerial elements. Why quality is most emphasized among them? To put this question into perspective, the following two points are emphasized. One is the special features of quality which distinguish it from cost and productivity, and the other is the harmonious relationship between quality and cost and between quality and productivity.

Special Features of Quality[1]

It can be said in the first place that the human desire for quality is not a new development, but the human history of quality is far longer than those of cost and productivity. It is well known that human beings are an animal that uses tools, and it is thought that our ancestors had a keen interest in the quality of their tools. In the early centuries, their major activities were hunting, stock raising and farming. All of these were aimed at providing food and clothing. The quality of first tools, such as the arrowhead, plow and hoe, affected prehistoric man's catch and harvest. Our ancestors learned the importance of quality from their own experiences over a very long time since their appearance on earth more than one million years ago.

Compared with quality, the human connection with money is much younger. Self-supporting life had continued for a long period during which people did not need to use money. Along with the specialization of jobs and the development of early cottage industry came the practice of bartering. This further evolved into trade among adjacent villages and among people who were far apart. Money was invented and used as a convenient tool to catalyze transactions. The concept of cost began to prevail much later - several thousands years ago, or, 10,000 years at the longest.

People started to discuss productivity during the industrial revolution about 200 years ago. The Taylor system originated only about 90 years ago.

As shown in Table 1, in comparing the human history of quality, cost and productivity, quality is the longest.

Table 1. Human History of Quality, Cost and Productivity

Quality	1,000,000 years
Cost	10,000 years
Productivity	200 years

It must be emphasized, on the other hand, that quality is a major concern between manufacturer and customer, though they sometimes might have a different definition of quality. In this regard, "customer satisfaction" or "fitness for use and environment"[2] from the viewpoint of customers is the most important concept in the company's activities of quality assurance.

In contrast to quality, customers do not have a keen interest in cost; their primary concern is the price. While the cost is determined by the conditions within the manufacturing company including the suppliers, the price is affected by the preference and demand of customers and by business fluctuation.

Goods are not sold simply because of higher productivity. The motive of the purchase might be that customers can buy and repair it at any time and at any place. In other words, they are persuaded by service performance after the sale.

The main concerns of the manufacturer and customer are summarized in Table 2. It is demonstrated that quality is the only common concern.

Table 2. Main Concerns of Manufacturer and Customer

Manufacturer	Customer
Quality	Quality
Cost	Price
Productivity	After-Sales Service

The desire for quality existed the longest, and quality is the common concern between manufacturer and customer. These special features of quality make it more compatible with human nature. It is due to this reason why the request for quality improvement by the upper managers is more easily sympathized and accepted by the subordinates than the call for cost reduction and productivity increase. Thus the quality improvement is the most appropriate and acceptable way for enhancing corporate performance.

Harmonious Relationship between Quality and Cost and between Quality and Productivity

There are opinions, on the other hand, that although the importance of quality improvement is well understood, cost increases and productivity decreases when quality is improved. Then what we should consider is to look for the optimum or balance between quality and cost and between quality and productivity.

It is often asserted in the manufacturing process, for example, that there be an optimum to quality of conformance, or percent defective, with regard to manufacturing cost. It is shown with solid line in Fig. 1[3]. Some analysts explain that increased conformance, or reduced percent defective, decreases the losses incurred by defects, but the cost of quality improvement needed for greater conformance rises sharply as quality approaches the perfect state. Thus the optimum, or the minimal total cost, should always fall short of perfection because the total cost soars as the percent defective approaches zero.

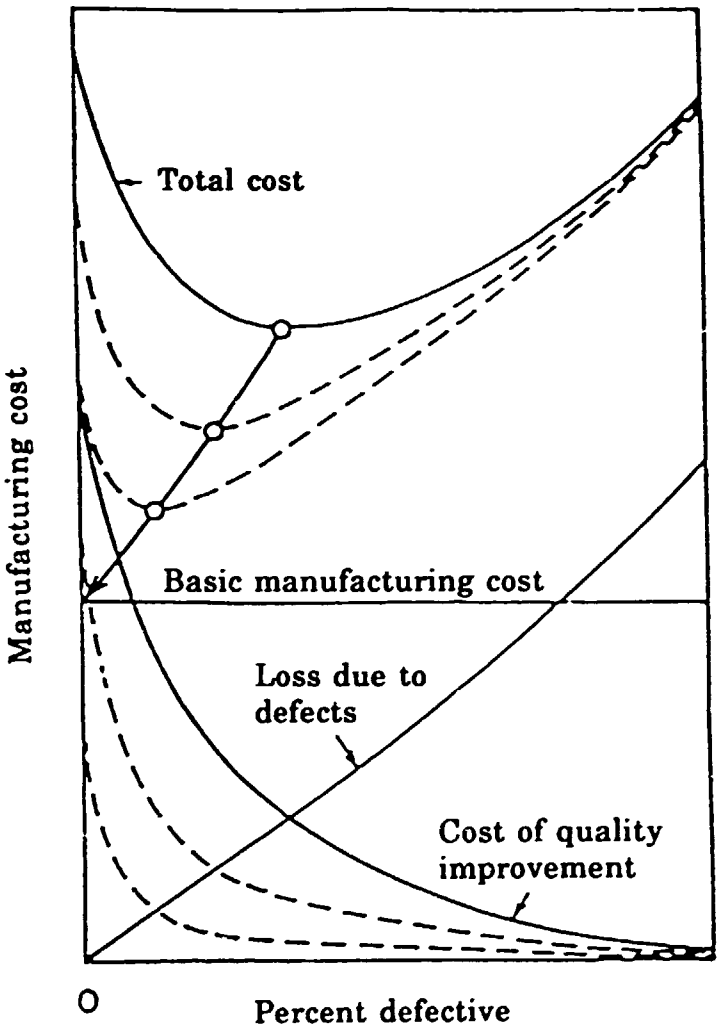

Fig. 1. "Optimum" of Manufacturing Cost

However, the above optimum is doubtful; first, it ignores the need of customers of which the final goal is zero defect, and second, it does not consider the competition in the market. If the competitor is successful in reducing the manufacturing cost by reducing the percent defective, for example, it is obvious that the name of this company will disappear from the telephone directory sooner or later.

We should understand the difference in character of the cost of quality improvement from those of basic manufacturing cost and losses incurred by defects. Both basic manufacturing cost and losses incurred by defects are easily defined, and each of them is demonstrated with a single curve determined by the definition, respectively. On the other hand, the cost of quality improvement is usually indefinable: we know that there are always plural ways of improvement, and it is not shown with a single curve. When some creative ideas with which we can increase the conformance with less additional cost are introduced, the curve of quality improvement cost is shifted down as shown with broken lines in Fig. 1. Then the resultant total cost is lowered, and the optimum moves toward zero defect. If we could succeed to improve the product quality without quality improvement cost, the optimum is consistent with zero defect. Thus the optimum is movable and indefinable. What we must really do is not to search for the indefinable optimum but to search for the ways and means with which we can improve the quality with minimum cost.

It may be said that the approach of this kind is a "breakthrough", which is quite different from the superficial optimization mentioned before. It is clear that the successful breakthrough is always accompanied by the creative idea and strong will of the people concerned.

Regarding the relationship between quality and productivity, Deming[4] told, "Productivity goes up, as quality goes up. This fact is well known, but only to a select few." This thought of harmonious relationship between quality and productivity is also based on the same idea of creativity, or breakthrough approach mentioned above.

Then it is summarized that when quality is improved in a creative way, cost is reduced and productivity is increased. It is seen that quality can be a cause of cost reduction and productivity increase, but low cost and/or high productivity do not always pave the way to quality improvement. It may be only logical, then, that we must start with quality whenever we attempt to improve a company's performance.

Backward and Forward Quality

It is important to note that Ishikawa[5] preferred to classify product quality as "backward" and "forward" qualities. Afterward, Kano[6] modified this classification to "must-be" quality and "attractive" quality, respectively, and demonstrated that they are mutually independent and that the classification should be two-dimensional.

Usual quality costs[7] only concern the must-be quality and are effective for reducing the failure costs caused by non-conformance, scrap, rework, customer complaint, compensation, etc., although these quality costs are usually calculated within the company, and much of the costs due to poor quality paid by the customers are ignored. In the evolution of modern quality assurance methodologies, the early practice of 100 percent inspection (sometimes, several hundreds percent inspection) gave way to process improvements including designing to avoid manufacture of defective products. If this reduces defect levels to zero,

the failure costs are remarkably reduced, and it solves the problem of short-term customer dissatisfaction but not necessarily the problem of customer satisfaction, or fitness for use and environment.

Providing attractive quality is indispensable for exploiting the way to customer satisfaction. By doing this, not only the improvement of market share but also the growth of market size due to synergetic effect are anticipated. As compared with must-be quality, attractive quality is easier to become latent and unnoticed by the customers themselves. In order to detect and grasp the hidden attractive quality, it is important for the manufacturer to collect and analyse the quality information from the market on the following items.

1. Customer demand, i.e. how the commodities are used and are convenient and inconvenient for the customers. The conditions of use,
2. Quality of similar commodities manufactured by the competitors,
3. Actual conditions of transportation and storage by distributors' channel and retailers,
4. Present and future market trend, etc.

The idea of hypothesis testing is effective in these surveys. The validity of the hypothesis that the handiness of a camera is the attractive quality for the customers, for example, is tested by counting and comparing the number of people carrying small-size cameras in downtown and in suburban areas[8]. The market survey of this kind should be carried out on the systematic basis.

In connection with the attractive quality, another problem of "surplus quality" which is mainly associated with higher quality of design should be discussed. A delicate balance must be struck between achievement of higher quality and the associated costs. Thus, conflicting pressures result from the desire to reduce costs and the desire to elevate the technological level of the company and its associated capability for new-product development. Since the era of the 1970s, Japanese television makers requested the manufacturers of electronic components to reduce defect levels below 10 parts per million. It took a great deal of effort to meet this request, but the result has been beautiful pictures on television sets, which are extremely reliable.[2]

PDCA Cycle

It is widely accepted in Japanese industries that the control of process follows the so-called Deming's cycle, which is composed of the four steps of plan, do, check and act, as shown in Fig. 2 (a)[2]. The objective (or standard) should be established and the process to attain the objective should be given before doing the work. The results are then checked by comparing them with the target or standard. Corrective actions of cause removal or standardization are taken when any significant difference is found, and its causes are elucidated. By following this plan-do-check-act (PDCA) cycle, it is expected that not only the results obtained but also the process itself are improved in an upward spiral.

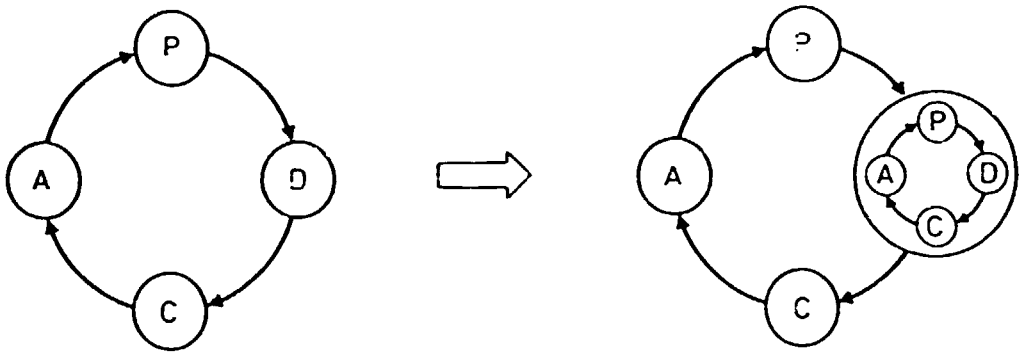

Fig. 2. PDCA Cycle

This may lead to improvement and strengthening of the company's performance.

In some forms of manufacturing, the quality standard and operation manual are established by the engineering staff and managers, and the workers are only requested to carry out their job of manufacturing in accordance with the established manual. Thus the planning and execution are separated. In such cases, if all the manufactured products are found to be non-conformance, the supervisor seeks the causes and may reproach the worker. The worker may then reply, "I am not responsible for the defect. I honestly followed the operation manual that you gave to me. You are responsible for the result." It is clear that when workers are responsible only for following the established manual, their responsibility for quality becomes obscure. Such vague responsibility is detrimental to high quality of conformance, which is achieved only if the workers are conscious of quality and have a keen sense of responsibility.

It is true that the workers are assigned to perform the manufacturing job. However, this job performance is also composed of a plan-do-check-act cycle, as shown in Fig. 2 (b). The extent to which PDCA cycle is followed in this portion of the overall job is considered to reflect the self-control ability of workers. Thanks to the ability of self-control, we humans can enjoy our lives, including sports and leisure. In order to cultivate the self-control capacity of workers, education and training are the indispensable prerequisites.

This process of PDCA cycle is somewhat different from the thought, "Do thing right the first time" which is prevailing in the Western countries. We are afraid that no one knows the right way of doing the work from the first. The right way given in the operation manual is not always correct and should further be improved. This is the reason why we emphasize and stick to the rotation of PDCA cycle without cease.

Problem Solving Approach

Many people maintain that the PDCA cycle should start from "check" phase rather than from "plan" phase, i.e., composing the cycle of CAPDCA. It

is important first to clarify the existing problems which hinder the attainment of the set goal. This is best elucidated by grasping the status quo attitude in the "check" phase. We endeavor then to solve the problem ("act" phase): the concepts and methods of QC seven tools[9] are effective. After major assignable causes are identified, the problems are best resolved by preventing such recurrence in the future. Previously inadequate standards and plans are modified, and improved PDCA cycles prevail.

The cycle mentioned above of CAPDCA is the so-called QC story itself which is purported to be a problem solving approach. The procedure of the QC story is summarized in Table 3. Most important in this approach is to elucidate the problems. Problems should be result oriented rather than procedure oriented. Comparison of actual data of result with targets, control limits, specifications, past data, the results of similar processes etc. may reveal some deviation. When the deviation discovered is seriously negative, we wish to eliminate it. A deviation on the positive side, on the contrary, necessitates clarification of the causes to maintain the superiority. After the current problems become clear, data are collected and analysed. The "vital few" problems can be determined from a Pareto diagram. A two-stage Pareto analysis always provides substantial information.

Table 3. Procedure of the QC Story

1.	Reason for improvement
2.	Current situation
3.	Analysis and goal setting
4.	Countermeasures
5.	Results
6.	Standardization
7.	Future plans

Goals should be inspiring and challenging; if not, people do not try seriously to achieve them. There are two ways of determining the target: from the top down and from the bottom up. Upper managers are always concerned about the future plan, and the top-down target is usually determined by considering the company's needs. On the other hand, subordinates usually investigate the draft target indicated by the upper managers from the viewpoint of feasibility. If the draft target is not investigated thoroughly by the subordinates, they can easily give good reasons for why they cannot achieve it.

After the data analysis, countermeasures are taken. This corresponds to the "act" phase in the cycle, in which two kinds of action, adjustment and cause removal or standardization, are taken. When it becomes clear that the target will not be achieved, people often assign more budget and work force in order

to attain the target within the time limit. Although this may be called a type of corrective action, it is actually a superficial countermeasure, or adjustment. A matter of greater importance is to detect the assignable causes of failure, defect, rework and delay and remove them from the process. If the deviation is serious on the positive side, on the other hand, we look for the causes and standardize them to maintain the desirable state. They are the action of cause removal or the standardization. It is clear that adjustment can be done without knowing the causes affecting the result, but the cause removal and standardization can be done only by accurately knowing the affecting causes. The process can be improved merely by the removal and standardization of the causes.

Improvement of the process is confirmed and standardized. Thus the PDCA cycle starts from the checking phase, and standards are made taking corrective actions. The effect of new standards is further verified during the subsequent rotation of PDCA cycles.

The above problem solving approach is inductive and based on firm data. It resolves problems and predicts the effects of remaining problems which will be resolved in the succeeding PDCA cycles. Sometimes, a vague and abstract problem can be of basic importance. In such a case, the utilization of a KJ diagram[10] is helpful to identify the problem definitely. The technique of quality function deployment[11] also is effective in casting an abstract problem in more concrete form.

Strategies for World Leadership Quality

Juran[12] gave his farewell lecture in Tokyo, October, 1989. In this lecture, he summarized the characteristic Japanese strategies for world leadership quality as follows.

1. The upper managers take charge of quality.
2. The entire hierarchy is trained in how to manage for quality.
3. Quality improvement is undertaken at a revolutionary rate.
4. The QC cycle concept enables the work force to participate in the quality revolution.

Supporting all of the above strategies has been the adoption of the factual approach, he added, in which making decisions is based on collection and analysis of data, rather than those based on opinions.

From the Japanese view, on the other hand, we have only honestly studied and followed the thought and ways indicated by Deming and Juran. We suppose that Japan is the only nation where the PDCA cycle is continually rotated very earnestly. Perhaps the overriding national priority to overcome the "quality crisis" since the late 1940s has been far stronger in Japan than the Western countries. "If Japan can, why can't we?" This is the title of a famous American TV program in the middle 1970s. On the contrary, the Japanese mind has been occupied by a thought, "If America can, why can't we?"

In the same lecture in Tokyo, Juran also warned Japanese that the Western countries are now in the process of adopting new strategies, some of which may well result in revolutionary improvements in their quality and that, in his view, the 1990s will become the decade in which the Japanese revolution in quality will encounter its first challenge.

Following this lecture, Juran[13] presented another paper "Strategies for World Class Quality" at the 34th EOQ Conference in Dublin, 1990. His major emphases in this address were as follows. The winning companies of the Malcolm Baldrige National Quality Award in the U.S.A. have made many stunning achievements in various fields within a few years. During making these achievements, the world-class quality companies learned a lot. The lessons they learned are summarized as follows.

1. Stretch goal can be met.
2. The Big Q concept must be adopted.
3. Clear ownership of multifunctional processes must be assigned.
4. An infrastructure for improvement must be created.
5. A lot of work is required.
6. Upper managers must personally lead the efforts.
7. The Taylor system must be replaced.
8. Quality goal must be incorporated into the business plan.

Comparing these lessons learned by the American companies with what are summarized as the Japanese strategies above, we can find a lot of similarities. Although the quality "climate" might be different along nations, the way leading to the world class quality is very similar. It may be said that the genuine way is single. The fair competition and mutual cooperation are the important and indispensable conditions for attaining the world leadership quality.

Summary

Quality has become a fundamental way of managing the companies for market growth and profitability, and the importance of quality is being emphasized in the present era of free market economy.

The human history of quality is far longer than cost and productivity, and quality is the only common concern between manufacturer and customer. These special features of quality make it more compatible with human nature.

When quality is improved in a creative way, cost is reduced and productivity is increased. Thus quality can be a cause of cost reduction and productivity increase. However, the opposite is not always true. It is only logical then to start with quality when we attempt to improve the company's performance.

In addition to improving must-be quality, providing attractive quality is indispensable for exploiting the way to customer satisfaction. By doing this,

the growth of market due to synergetic effect is also anticipated. The idea of hypothesis testing is effective in the market survey of attractive quality.

By following the cycle of plan-do-check-act, it is expected that not only the results but also the process itself are improved in an upward spiral. The importance of self-control of workers is emphasized to clarify their responsibility and bring up their humanity. The process of this PDCA cycle is different from the thought, "Do thing right the first time". We are afraid that no one knows the right way of carrying out the work from the first. The PDCA cycle should start from "check" phase clarifying the problems. Problem solving approach of this kind is based on the data and effective for improving the process.

Comparing the Japanese strategies with the lessons learned by the American companies which won the Malcolm Baldrige National Quality Award, no significant differences are found. It is thought that the way leading to the world-class quality is very similar among various countries.

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1st day
Jan. 26 – 28, 1993

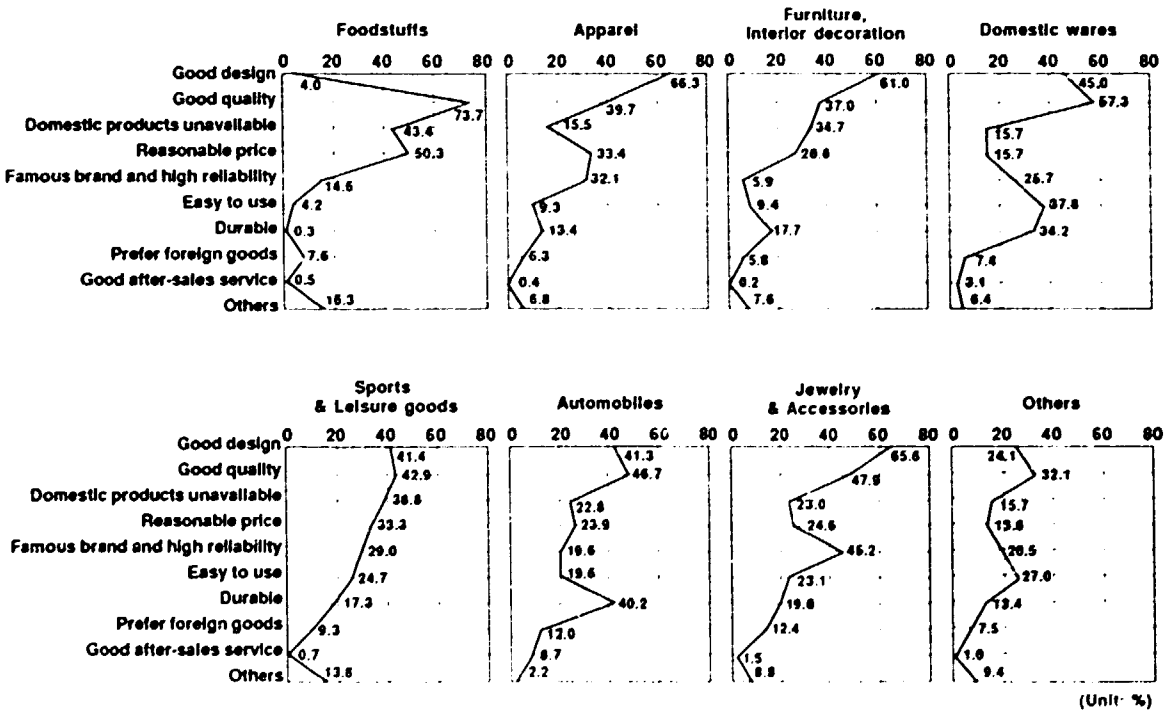
SESSION I: QUALITY MANAGEMENT

Application of CWQC to the Company Management

by Masaru SEKIGUCHI
Advisor,
Eiko Ltd.

1. Introduction

Two years ago, MIPRO Japan investigated consumers' interest of imported goods and reported the result of the investigation. The results are indicated in Fig. 1. Almost all types of imported goods, quality and design are the highest ranked of interest. It means consumers select imported goods with quality related items in mind, when they want to buy them.



Manufactured Import Promotion Organization, Japan (MIPRO JAPAN)
Oct. 1990
(Rearranged by Masaru SEKIGUCHI)

Fig. 1. Customers Select Imported Goods in This Manner

Recently in Japan, TV news reported, that 67% of consumers select the commodities by quality, and 15% of them select by price, and only a few select by appearance.

Customers select goods in this manner, so we have to understand the customers needs correctly and reflect it to the management policy.

2. Purpose of Quality Control

2.1 Definition of "Quality Control"

I would like to touch upon the definitions of the terms related with quality. Please refer to Table 1.

ISO 8402 defines the term "QUALITY", "QUALITY CONTROL" and "QUALITY MANAGEMENT" as follows.

It says, "QUALITY" is "the totality of features and characteristics of products or services that bear on its ability to satisfy stated or implied needs." And "QUALITY CONTROL" is "the operational techniques and activities that are used to fulfill requirements for quality." And also "QUALITY MANAGEMENT" is "the aspect of the overall management function that determines and implements the quality policy."

The Japanese Industrial Standard (JIS) Z 8101 provides an explicit definition of quality control.

It says, "QUALITY CONTROL" is "a system of measures by which the qualities of products or services are produced economically to meet the requirements of the purchaser (The rest is omitted.)."

According to these definitions the basic concept of quality control has developed from the so-called "customer- (or, consumer-) oriented concept," which requests that a company produce products and services of marketable quality.

In order to perform quality control effectively, throughout all phases of the enterprise activities such as market survey, research and development, planning of product, design, production readiness, procurement and subcontract, manufacture, inspection, sales and after sales servicing as well as finance, personnel affairs and indoctrination, all personnel including the executives to the managers, foremen and workers are required to participate and collaborate. The quality control activities conducted in such a way is called "COMPANY-WIDE QUALITY CONTROL (CWQC)" or "TOTAL QUALITY CONTROL (TQC)."

The purpose of quality control (hereafter it is abbreviated as QC), therefore, is to conform the quality of a company's products or services to the "CUSTOMER'S NEEDS." A company should effectively and systematically coordinate the activities of all the divisions and sections, in order to achieve quality, cost and delivery, as requested by the customer.

Table 1. Definition of Quality, Quality Assurance and Quality Control (Quality Management)

	Japanaese Industrial Standard (JIS) Glossary of Terms Used in Quality Control (JIS Z 8101:1981)	International Organization for Standardization (ISO) Quality-Vocabulary (ISO 8402:1986) Quality management and quality assurance standards — Guidelines for selection and use (ISO 9000:1987)
Quality	The totality of proper characteristics or performance which are the objects of estimation to determine whether a product or service satisfies the purpose of use or not.	The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.
Quality Assurance	The systematic activities carried out by a producer to guaranty that the quality required by the consumer is fully satisfied.	All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.
Quality Control	A system of means whereby the qualities of products or services are produced economically to meet the requirements of the purchaser. "Quality control" is sometimes called "QC" for short. In addition, since modern quality control adopts statistical techniques, it is sometimes especially called tōkeiteki hinshitsu kanri ("statistical quality control", and "SQC" for short). In order to perform quality control effectively, throughout all phases of the enterprise activities such as market survey, research and development, planning of product, design, production readiness, procurement and subcontract, manufacture, inspection, sales and after sales servicing as well as finance, personnel affairs and indoctrination, whole personnel including from the executives down to the managers, foremen and workers are required to participate and collaborate. The quality control activities conducted in such way is called zenshateki hinshitsu kanri ("company-wide quality control", and "CWQC" for short) or sōgōteki hinshitsu kanri ("total quality control", and "TQC" for short).	Quality control: The operational techniques and activities that are used to fulfil requirements for quality. Quality management: That aspect of the overall management function that determines and implements the quality policy.

Customer's needs for quality are changing with the passage of time. A product or a service, which used to be considered either impossible or uneconomical to make (in other words, could not conform to market needs), may suddenly attract attention, depending on a new technological development. Customer's needs for quality is a comprehensive list of functions, usefulness and performance of a product or a service, which is put forth by economy minded customers. A company, therefore, should always try to satisfy customer's needs by constantly improving quality through various means, including new technology development.

We should therefore, take quality as the largest managerial concern, giving the highest priority to quality, and after the concept of quality has been firmly established in companies, we should think of improvement of productivity, reduction of costs and shortening of delivery time based on the above grounds.

2.2 Control

Good quality of the process to create quality of output is a precondition to expect products and services of good quality. In Japan's Quality Control, the concept of control is understood as the PDCA management cycle as shown in Fig. 2. Control is considered to implement planning, doing, checking, and action (PDCA) for improving quality of the process and to maintain the upward spiral of quality output.

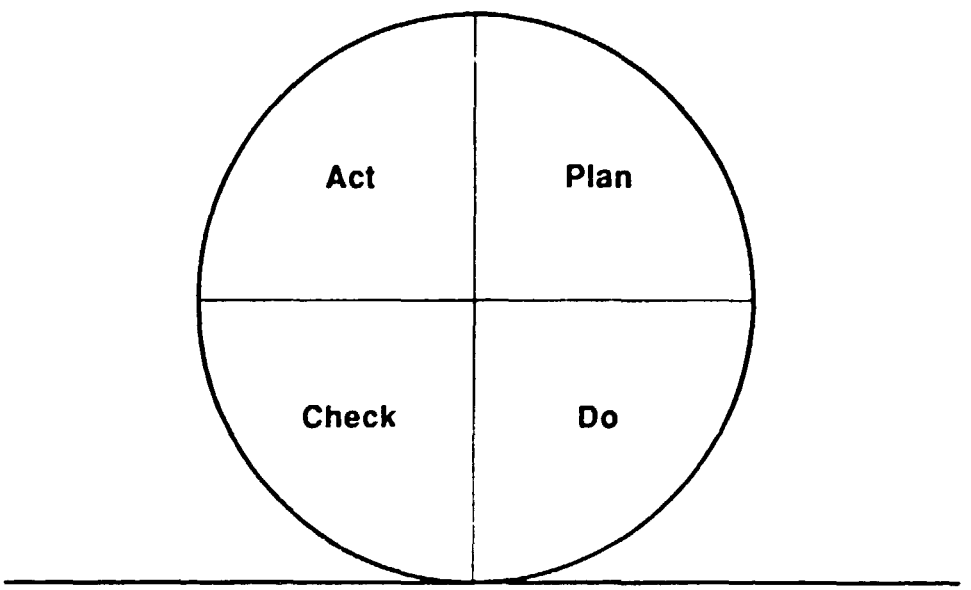


Fig. 2. Management Cycle in Quality Control (PDCA Cycle)

The word "control" which we use does not include the concept of merely judging acceptance of rejection by inspections or that of tightening. The concept of control in the words "quality control" which we talk about should rather be understood as "management." The cycle of PDCA has recently been called management cycle, it is the same concept as control cycle.

As I have mentioned above, quality control should be understood as rotation of the PDCA cycle on quality.

3. Importance of thorough implementation of CWQC

3.1 Characteristics of Japanese CWQC

Characteristics of Japanese CWQC is shown in Table 2.

With implementation of CWQC, top management policy is most important to achieve success and to penetrate the quality consciousness throughout the enterprise. Zeal and attitude of top management on CWQC is also important.

You can understand the top management policy indicated item No. 1, 2 and 3 in Table 2 are most important to promote CWQC. Item No. 9, describes CWQC is now extendeds its application from manufacturing to other industries, such as service industries, for example, banks, hotels, department stores, transportation etc., and construction companies, electric power companies. These are the significant characteristics of Japanese CWQC.

QC education and training is described in item No. 7 in Table 2.

"QC starts with education and ends with education" is a phrase said by Dr. Kaoru Ishikawa, an emeritus professor of the University of Tokyo. This can be rephrased "Education is the most important factor in QC. QC has to start with education and education should be continuously carried out." Factors indispensable for corporate management are men, goods, money, information and trust, among which "men" should be classed as the most important. In order for each employee to understand the social responsibility of a company properly and to be motivated to take action in compliance with the president's policy, top managements to put priority on human resource development and provide employees with well-planned education and training continuously. When each employee has an appropriate understanding of quality to be conscious of his responsibility, and thinks and acts based on that responsibility, the fundation of corporate development will be secured.

QC education should be continuously and repeatedly carried out. Every year new employees join a company, while talented senior employees unavoidabiy have to retire. Therefore, it is the seniors' duty and responsibility to hand down their experience to younger employees through education and training. OJT (On the Job Training) carried out in the daily work is the center of QC education and training. OJT, however, is not sufficient to fully understand QC. Providing employees with OFF-JT, such as participation of QC seminars held inside and outside of the company, is also necessary to foster employees with a wide perspective, advanced knowledge and a sense of consciousness. In particular, education to managers and supervisors who are influential as leaders in enterprises is of great importance.

Table 2. Characteristics of CWQC in Japan

(1) President-led QC activities in which All Departments and All Personnel Participate;

(2) Top Priority Consistently Assigned to Quality by Management;

(3) Policy Dissemination and Control by Delegation;

(4) QC Audits and their Implementation;

(5) Quality Assurance Activities Ranging from Planning and Development to Sales and Servicing;

(6) QC Circle Activities;

(7) QC Education and Training;

(8) Development and Implementation of QC Techniques;

(9) Extension of Applications from Manufacturing to Other Industries;

(10) Nation-wide QC Promotion Activities:

In order to make company-wide QC successful, top management including the president who decides the company's basic management philosophy has to take initiative in taking part in QC seminers and conferences. Top management must take the lead in studying and understanding QC.

QC education and training should be given in the following areas.

I) Philosophy

II) Understanding QC techniques and its application

III) Evaluation and promotion system

These three factors are common to all echelons of the company, although where to put priority may depend on to whom education and training are given. At the same time, through education and training, consciousness toward the importance of "standardization" should be implanted thoroughly in the whole company as the backbone of QC.

3.2 Basic principle of quality control

In Table 3, this is the basic principle of quality control shown as "QC APPROACH".

Important items are,

1) Quality first concept,
2) Customer orientation,
3) Use effectively statistical methods,
4) To speak with fact and data,
5) Thorough implementation of PDCA cycle and improvement,
6) Thoroughgoing standardization, and
7) The management respect for humanity.

Table 3. QC Approach

(1) Standing on the concept of customer oriented	To work thoroughly on the principle of quality first (quality consciousness) • To produce and supply economically goods and services of the quality responding to the needs of users. • To keep a balance of Q (quality), C (cost) and D (delivery time and quantity), but "QUALITY FIRST" • To have a concept that not only doe quality refer to that of products but that of work, services and all other things ····→ Quality of output To have a thorough concept that the "following processes are our customers."
(2) Use of QC methods	Taking root in the statistical quality control (SQC) and use effectively statistical methods To use thoroughly Seven Indispensable Tools for QC Active introduction and use of various managment techniques.
(3) Management and improvement based on facts	To speak with facts and data • Practice of the principle of actual goods and spots Thorough implementation of management (rotating PDCA cycle) Thorough implementation of improvement (to follow procedures for solving problems) • Thorough implementation of analysis (to pursue the relationship of cause and effect) • To take countermeasures against causes Thorough implementation of priority management Completed with a QC story
(4) Emphasis on good processes which bring good results	Grasp of dispersion • Grasp of the dispersion of works Emphasis on processes • Good results are brought by good processes • Bad results are brought by bad processes • Meaning of "good processes" which bring good results Good processes which brought good results and their cases clarified Bad processes and their causes clarified so that recurrence of bad results may be prevented Thorough implementation of stratification
(5) Thorough implementation of standardization	Standardization for enabling maintenance and reproduction of good results Standardication to prevent recurrence of bad results (Note) Standardization mentioned here includes revisions of standards
(6) Management that respect for humanity	Human-centered management Display human capabilities fully and eventually draw out infinite possibilities Respect for humanity and build a worthwhile to live, and happy bright workshop

4. Methodology on CWQC

In order to perform CWQC, throughout all phases of the enterprise activities and all of the personnel including the top-management down to the managers, foremen and workers are required to understand the effective use of QC methods and tools. An idea of the relationship between the levels or divisions of the enterprise and QC methods are indicated in Table 4.

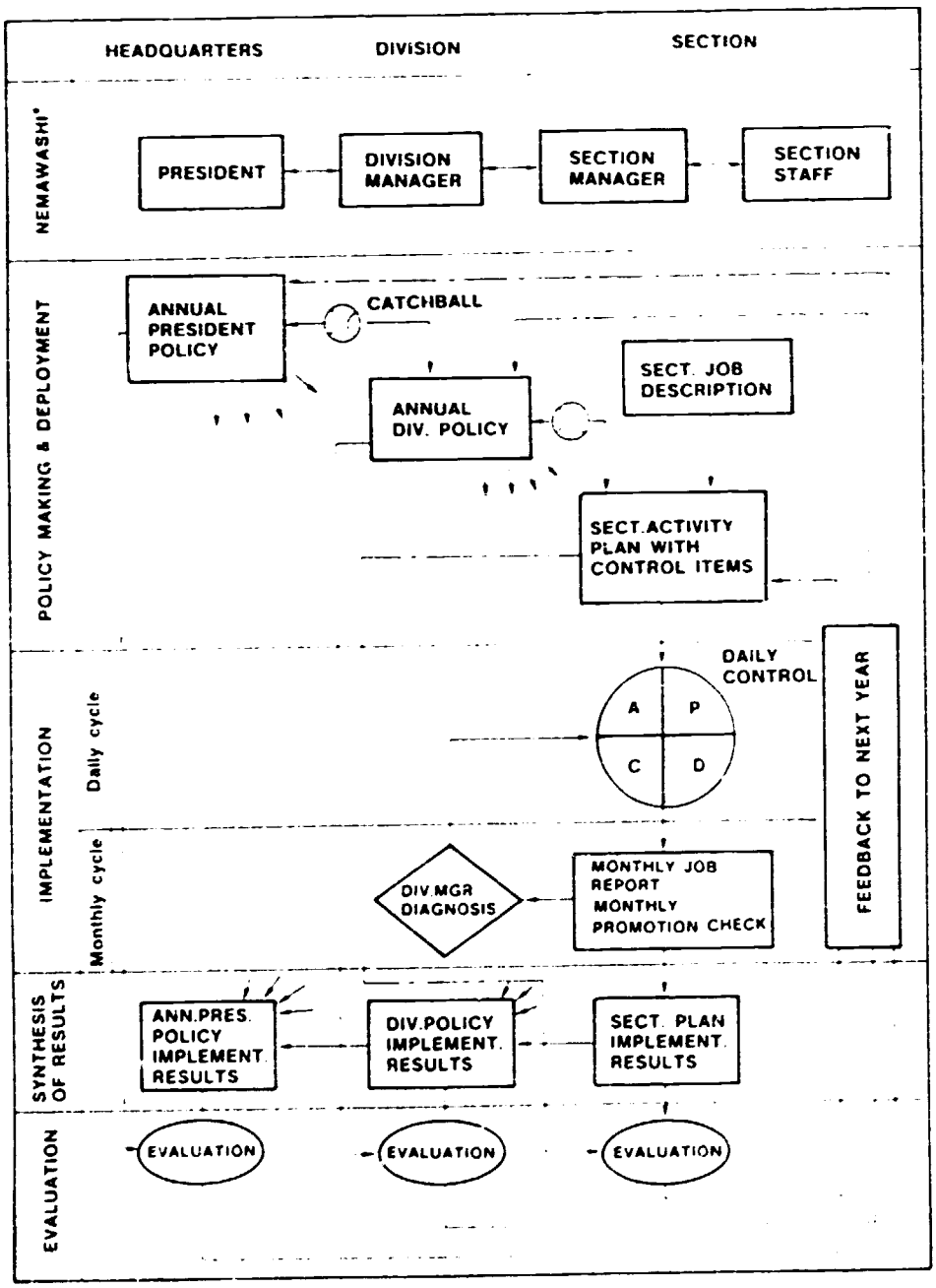
Table 4. Methodology on CWQC

	Top Management	Middle Management	Planning / R & D	Designing	Production Engineering	Manufacturing / Inspection	Sales
1. Policy Management	◎	◎	○	○	○	○	○
2. Statistical Method			○	○	○	◎	○
3. Seven QC Tools			○	○	○	◎	◎
4. Experimental Design			◎	◎	◎	○	
5. Multivariate Analysis		○	◎	◎	◎	○	○
6. Quality Engineering (TAGUCHI Method)			◎	◎	◎	○	
7. Seven Management Tools for QC		○	○	○	◎	◎	◎
8. Quality Deployment (Including FMEA – FTA and DR)		○	◎	◎	○	○	◎
9. Cross -Function Management	◎	◎	○	○	○	○	○
10. Quality Diagnosis	◎	◎	○	○	○	○	○
11. QC Story		○	○	○	○	◎	◎
12. Others (a) 5S					○	◎	○
(b) TPM					○	◎	
(c) Suggestion System						◎	◎

I) Policy management system

An example of "Policy Management System" is shown in Fig. 3.

Big PDCA cycles in the "Policy Management System" are rotating every year in the whole enterprise. Mutual understanding and mutual recognition of the management policy between the level of the hierarchy of an enterprise are completed. And all policies are oriented to the managerial philosophy of the top management.



By Dr. Noriaki Kano, Science University of Tokyo.

* NOTE "NEMAWASHI" means "exchange of opinions and mutual understanding and consensus of policy."

Fig. 3. Policy Management System

II) QC story

QC story is one of the QC methods using very many aspects of problem solving. QC story has been used in every QC circle conference combined with other QC methods, and the essence of the report can be understood by the audience correctly and perfectly in a very short time. It is indicated in Table 5.

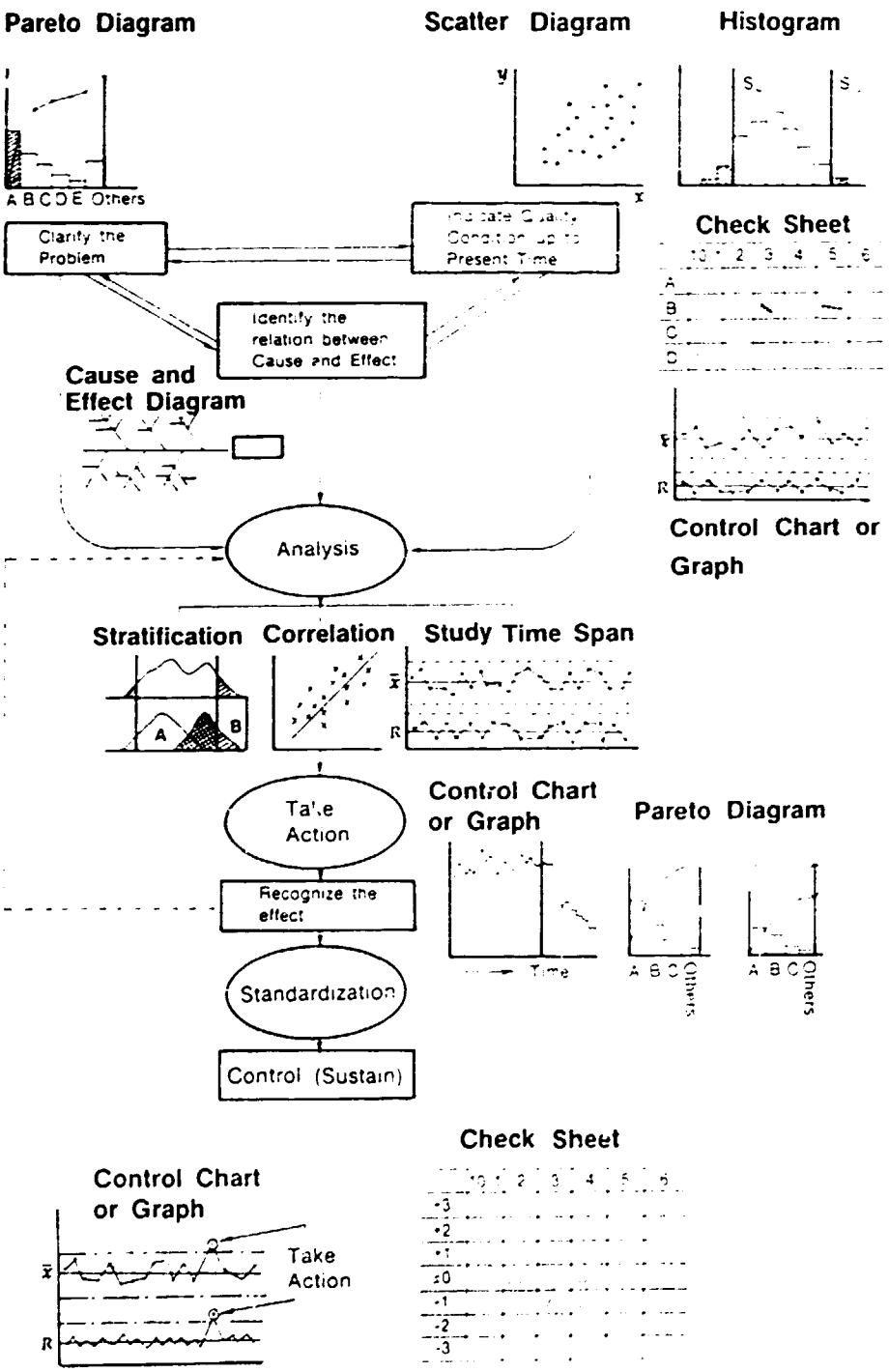
You can see the main steps are almost equal between "the procedures for solving problems" and "QC story".

Table 5. Report by a QC Story

PROCEDURES FOR SOLVING PROBLEMS	QC STORY
	INTRODUCTION
SELECTION OF A THEME	REASONS FOR THE SELECTION OF A THEME
GRASP OF THE PRESENT SITUATION AND ESTABLISHMENT OF THE TARGET	GRASP OF THE PRESENT SITUATION AND ESTABLISHMENT OF THE TARGET
PRODUCTION OF AN ACTION PLAN	ACTION PLAN (SCHEDULE)
ANALYSIS	ANALYSIS
EXAMINATION AND EXECUTION OF COUNTERMEASURES	COUNTERMEASURES
CONFIRMATION OF EFFECTS	CONFIRMATION OF EFFECTS
FIXING OF STANDARDIZATION AND MANAGEMENT	STANDARDIZATION AND SUSTAINING (TO PREVENT BACKSLIDING)
	REVIEW AND REMAINING PROBLEMS
	FUTURE PLAN

(BY T. SUGIURA, Y. YAMADA, QC STORY, JUSE)

III) QC seven tools are very often used during the solving of problems. Those of them are indicated in Fig. 4, according to the flow chart of QC story.



By T. Yoneyama : Textbook of QC practice (JUSE)

Fig. 4. How to Use the Seven (7) Indispensable Tools for QC

IV) Standardization

Standardization secures the basis of QC.

What has been specified in standards should be conveyed thoroughly to all the workers, and conveyed securely to successors by systematic education and training. The results of improvement should be reflected promptly in the standards to raise the level of their contents. The standards will, then, continue to be effective as standards always alive. For the means to achieve the above OJT and OFF-JT should be properly implemented, and workers should be correctly and repeatedly educated concerning the contents of the standards.

In order to make the standards always work efficiently as living standards, the following are required:

1) Full exchange of opinion of those concerned,
2) Reflection to the contents of the standards,
3) Recognition based on the responsibility and authority of responsible persons,
4) Thorough notification to all the members,
5) Secure conveyance to successors by systematic education and training, and
6) Implementation of improvement and reflection to the standards.

It is impossible to maintain the standards, if even one of these processes is neglected. The main standards of production are shown in Table 6.

Table 6. Kind and Content of Main Standards

Kind of standard	Main content specified
Product standards	Target characteristic value or limit of characteristics to be established, taking into account the demand of a customer, the market condition, our principle of management, technical capability, and the cost, etc.
Inspection standards	Test and inspection method, judgment method, records, etc. of products, semi-finished products, materials and parts.
Material standards	Quality, packing method, test method, etc. to be provided of raw materials, auxiliary materials, parts, etc. to use.
Manufacturing process standards (Quality control process chart)	Manufacturing process, machine, equipment, instruments, control items, quality characteristics, etc. to become a standard by product.
Technical standards	Technical conditions in manufacturing, their technical bases, management method, etc.
Manufacturing standards	Manufacturing method, procedure, operating conditions, control method, in manufacture.
Machine and equipment control standards	Methods of inspection, maintenance, servicing, etc. of machines and equipment related to the manufacture.
Measuring instrument control standards	Inspection, repair, maintenance, traceability, other control methods, etc. of measuring instruments.
Packaging standards	Packing method, materials for packing, display identification method, packing inspection method, etc. to protect quality of the products and its identification.
Business standards	Various kinds of business proceeding methods, procedures, formats, responsibility, authority, etc.

V) QC circle activity

QC circles were born in Japan in 1962 and developed rapidly thereafter. However, these QC circles refer to the activity taking place at the lower levels of organization within a company and although they make an extremely valuable contribution to CWQC, they should not be confused with CWQC itself.

The number of QC circles and QC circle members in Japan which were registered at QC circle headquarters are 353,082 and 2,723,457 respectively as of 1992.10.31. Furthermore, the number of unregistered QC circles seems to be double or triple.

QC circle members used them positively to improve their own workshops by resolving daily problems. Later, the scope of application of QC techniques were expanded to the planning, design, research & development, sales and service fields. Versatility of the techniques is always highly appreciated. Indeed, QC has been a major locomotive of Japan's economic growth by way of solving troubles, improving productivity, and reducing costs.

More and more people will recognize the significance of QC, and QC's scope of application is expected to further expand in the future.

The basic idea behind QC circle activities are indicated in item No. 2 in Table 7.

Table 7. Fundamentals of the QC Circle

1. What is the QC Circle?

The QC Circle is

a small group

to perform voluntarily quality control activities

within the same workshop.

This small group carries on

continuously

as a part of company-wide quality control activities

self-development and mutual-development

control and improvement

within the workshop

utilizing quality control techniques

with all the members participating

2. The Basic Idea Behind QC Circle Activities

The basic idea behind QC Circle Activities carries out as a part of company-wide quality control activities is as follows;

Display human capabilities fully and eventually draw out infinite possibilities,

Respect humanity and build a worthwhile to live and happy bright workshop,

Contribute to the improvement and development of the enterprise.

(BY QC CIRCLE KŌRYŌ : QC CIRCLE HEADQUARTERS , JUSE)

VI) 5S

Everyone is familiar with the "5Ss" and it is very important to make them the foundation of CWQC. Please refer to Table 8.

Table 8. Definition of 5S

整理	⟨SEIRI⟩	– to distinguish and get rid of unnecessary items/materials
整頓	⟨SEITON⟩	– to tidy up the room – to reorganize or rearrange things so you know exactly where they are when needed
清掃	⟨SEISOU⟩	– to clean, to sweep, to wipe, to dust, or to vacuum the room and facilities
清潔	⟨SEIKETSU⟩	– to practice personal hygien and washing your clothes as often as you can
躾	⟨SHITSUKE⟩	– to have good manners – to recognize the correct way without requisition – to be virtuous – to be consideration of the feelings of others

5. Evaluation system on CWQC

5.1 Diagnosis by the President

What is most important in QC activities is that the company president or the person in charge of each section should recognize the importance of QC properly and show leadership in promoting the activities. Diagnosis by the president is one of the very important concrete measures to promote QC. The president himself goes to each section and receives reports about QC activities from the person in charge (e.g. factory manager, general manager).

The following constitute the major items of the diagnosis.

1) How the president's policy has been broken down at each section, taking problems of a section into consideration.
2) What kind of QC activities have been planned for the item which is mentioned above.
3) To what extent QC activities have been implemented.
4) What kind of problems have been produced after implementation.
5) How to take action against the problems.
6) What are problems in carrying out QC activities.

Advantages of the diagnosis are as follows;

1) The diagnosis will make it clear that the president himself is interested in quality control and will help make QC activities much more motivated.
2) The president himself will be able to confirm problems of each section.
3) As president and the person in charge of each section can spend a long time talking with each other, they can communicate their thoughts thoroughly.
4) As the president will express his intention and decide the matter on the spot, countermeasures will be taken quickly and easily.

5.2 Mutual diagnosis of QC

The in-house mutual diagnosis of QC is very effective for a method to clarify issue by diagnosing the state of implementation of quality control and take measures in the early stage.

A diagnosing team consisting of representatives of the head office and factories visits a factory other than their own factories and diagnosis the state of implementation of QC based on the check list of the predetermined diagnosing items. Before visiting those concerned should be notified and make preparations. The items to be checked with priority in the mutual diagnosis of QC are decided centering on priority items decided in the QC policy of the fiscal year, and explanations should be requested to the state of implementing improvement for defective items found in the previous year. The main purposes of the mutual diagnosis of QC are:

1) Review of standards and their secure implementation,

2) Mutual enlightenment of those who diagnose and those who are diagnosed,

3) QC education of managers, and

4) Grasp of the actual state of the QC capability of the whole company.

6. Suggestion system

The stand point between suggestion system and QC circle activity is different. But QC circle activity supports the suggestion system. The zeal and attitude of the top management is reflected strongly on both activities.

7. Conclusion

Finally I would like to stress the following:

The zeal and attitude of top management towards CWQC is very important.

The management's thorough understanding and enthusiasm for promoting standardization and quality control are conductive to increasing the morale of operators and workers. Zeal for QC, however, does not penetrate the whole company overnight. It takes at least six months or one year.

For the prosperity and development of a company, nothing is more important than cultivating human resources. Education and training for nurturing capable employees should be a priority issue of the management. It takes time to educate and train people. Education, therefore, must be conducted systematically and continuously for all levels of employees.

Education and training is instrumental in developing human resources and in strengthening corporate fiber. In addition, it is a most effective way to let all the employees correctly understand the purposes and significance of standardization and quality control. QC education and training should be given in the area of "Philosophy", "Methodology" and "Evaluation and Promotion system."

When everybody's hard work is centered on the corporate policy, the company's performance can be boosted dramatically. There should be no inconsistence in understanding on standardization and quality control among executives. The higher the rank of management, the more willing they should be to receive education.

If a company entrusts a part of the manufacturing processes to its affiliated companies and subsidiaries, the company should provide opportunities of education and training for all the employees of the companies within the group. Technical guidance for the affiliated companies must be given in a systematic and continuous manner.

An indispensable ingredient for the systematic promotion of CWQC, including the standardization, is the strong leadership of management, especially the president. The top managers should be always supporting CWQC promotion so that the facilitators can give full play to their ability. Whether the top managers, including the president, understand and are committed to CWQC, virtually decides the success of CWQC promotion.

CWQC, when implemented in this manner, is able to contribute effectively to development and growth of enterprises by means of the company wide quality management system. It must achieve the economic growth of the country and succeed in the objective of being a fully industrialized country.

(MEMO)

1st day
Jan. 26 – 28, 1993

Programme

on

QUALITY, STANDARDIZATION AND METROLOGY

Gilles LEDOUX

Associate Industrial Development Officer

UNIDO, Vienna, Austria

UNIDO has been engaged in an extensive programme of technical assistance to developing countries in the disciplines of Quality, Standardization and Metrology (QSM) since 1967. This has provided valuable development to the relevant organizations, institutes and enterprises of recipient countries . This paper describes how, based on actual mechanisms of Quality at the national level, UNIDO can assist governments to assess and design development programmes in the field; then how the technical projects' contents have changed during the last few years to fulfil higher development needs and take international new practices into account.

Vienna, December 1992

Programme

on

QUALITY, STANDARDIZATION AND METROLOGY

Contents

1. INTRODUCTION

Three important notions

Quality has never been the result of chance or pure accident. It is always the fruit of some planned activities for which all the means available must be deployed. Nor is Quality a new concept of economic development. Only the markets have changed, as well as manufacturing processes and quality control techniques. Today, individual care is not sufficient: quality of products and services must be an issue addressed by a real management process, never forgetting the three basic notions of quality: expressed quality, planned quality, carried out quality. The quality that has been carried out by the enterprise must be as close as possible to the quality expressed by the client/customer. Quality management must therefore be planned and integrated in all the functions of the enterprise, driven by a clear, widely disseminated quality policy.

Three important notions

Quality expressed by the [illegible]

Quality [illegible]

Quality carried out after [illegible]

Every deviation from the expressed quality leads to [illegible] of the customer and [illegible]

IF OUR MANUFACTORIES IMPOSE BY DINT OF CARE, THE MAJOR QUALITY TO OUR PRODUCTS, THE FOREIGNERS WILL FIND ADVANTAGE IN PROVIDING THEMSELVES IN FRANCE AND THEIR MONEY WILL FLOW INTO THE KINGDOM

Jean baptiste COLBERT

August, 3 rd 1664

Quality is not a new concept of economic development

Integration of quality at the enterprise level

- The marketing plan will establish linkages with the clients/customers in order to be aware of their actual needs. The needs are changing as fast as the market environment: a constant update is necessary to remain competitive.

- The research and development plan will facilitate the design of [illegible] and [illegible]

[illegible]

- [illegible] from [illegible] [illegible] [illegible]

[illegible] when an appropriate partnership with the supplier will guarantee reliability, continuity and delivery of quality in time.

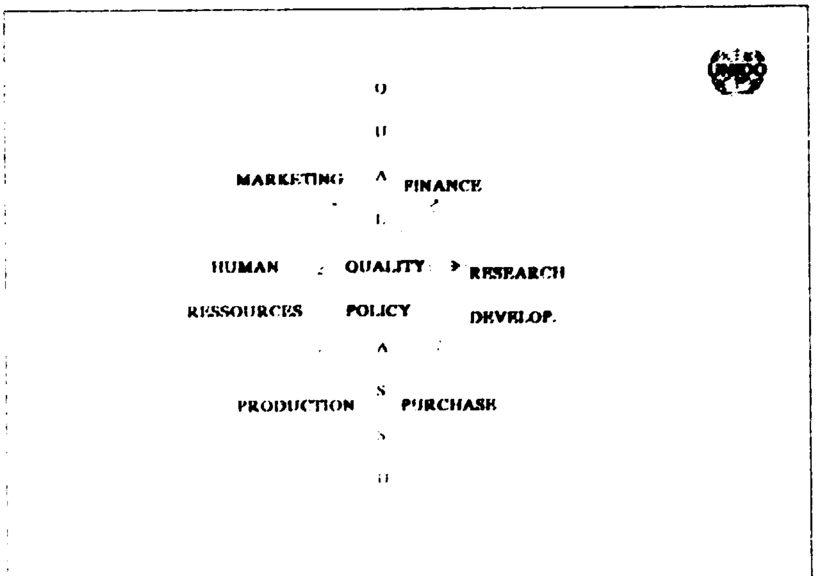
- The financial plan will provide the company with the means to keep production costs under control in terms of goals' achievement and enterprise performance. All costs related to quality improvement and control will be registered and managed.

- The human resources plan will permit people to be totally involved in the company policy. The good initiatives and performances will be recognized and accurate training will be provided in line with the needs of the enterprise. Communication channels will be established to this end.

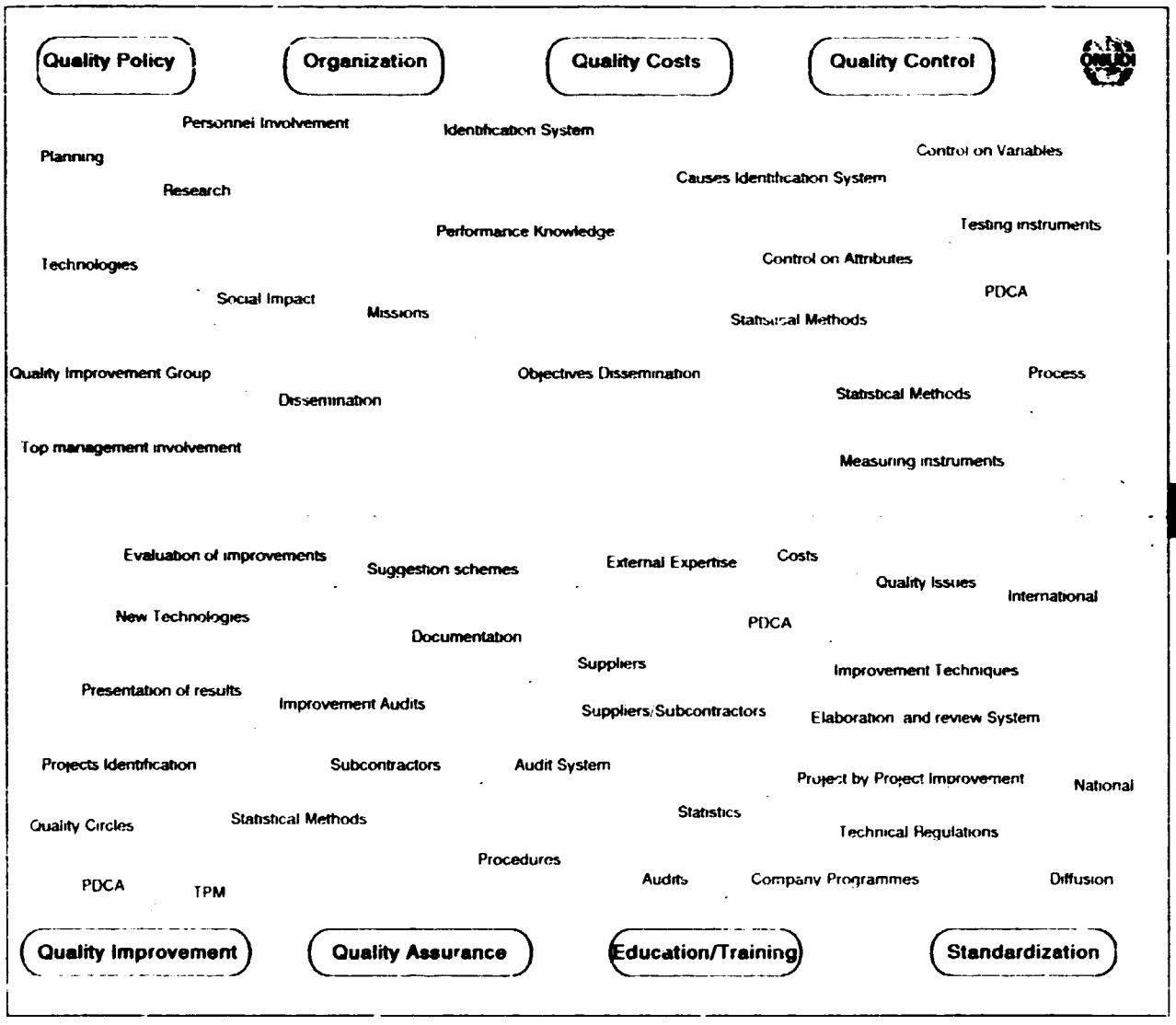
- Finally the quality assurance plan will foresee preventive actions and guarantee that the quality goals are reached. This plan will address all the above mentioned functions and will channel quality figures to the top management of the company in order to design updated plans.

The following cause-effect diagram gives an easy readable scheme of how at the company level, necessary management tools participate in the implementation of a total quality system. As seen before, the company quality policy will establish the basic guidelines to implement total quality through the above mentioned plans and an accurate quality system.

Quality improvement, quality costs' identification, quality assurance and quality control will be subject to special programmes. These programmes will utilize a maximum of statistic tools, will be constantly reviewed and improved according to the PDCA (Plan-Do-Check-Analyze) process. Appropriate measuring instruments and testing facilities will make sure that the whole system works. An efficient and well adapted training programme will address the needs of the company and fulfil personnel expectations. Finally, an effective standardization system will formalize the technical know-how of the enterprise, as well as the management and production process.



Integration of Quality Management at enterprise level



The best causes having always the best effects...

Is the enterprise alone in the struggle?

The above ideal system is well adapted to the international trade competition and will comply, if well documented, with international quality assurance specifications and certification systems. Now, does such a system depend on the entrepreneur alone?

Imagine a country where the expressed quality is known through wrong channels: civil servants assumptions, non accurate sources of information, restricted documentation, personal interests of traders etc. The best manager of the world cannot establish any marketing plan and will loose money, time and energy to produce reliable, attractive and safe goods that the final client does not need!

Imagine also the same country, where the rules are not the same for everybody (private sector, public companies, importers, exporters), where technical knowledge and technologies are not available or accessible, where quality of raw materials, suppliers, times of delivery of spare parts, financial markets, political decisions and economic situation are not under control, where the level of basic education is low and the human conditions are bad. What kind of quality can be planned? Who would dare speak of Just In Time techniques when communications and power supply are not reliable, the transports are subject to imponderables, when goods have to wait months on harbours before custom's clearance? What kind of quality assurance can exist in such a country where it is foreseeable that no national standardization, metrology, testing and quality training facilities are available? It is evident that the quality carried out by an industrial enterprise surviving by chance in such a wild environment can be subject to questions.

Three levels for a national system

Awareness and control of quality management techniques at the enterprise level are therefore not enough to compete effectively on open markets. A real quality environment must provide the enterprise with the necessary services, facilities, support, help and partnership.

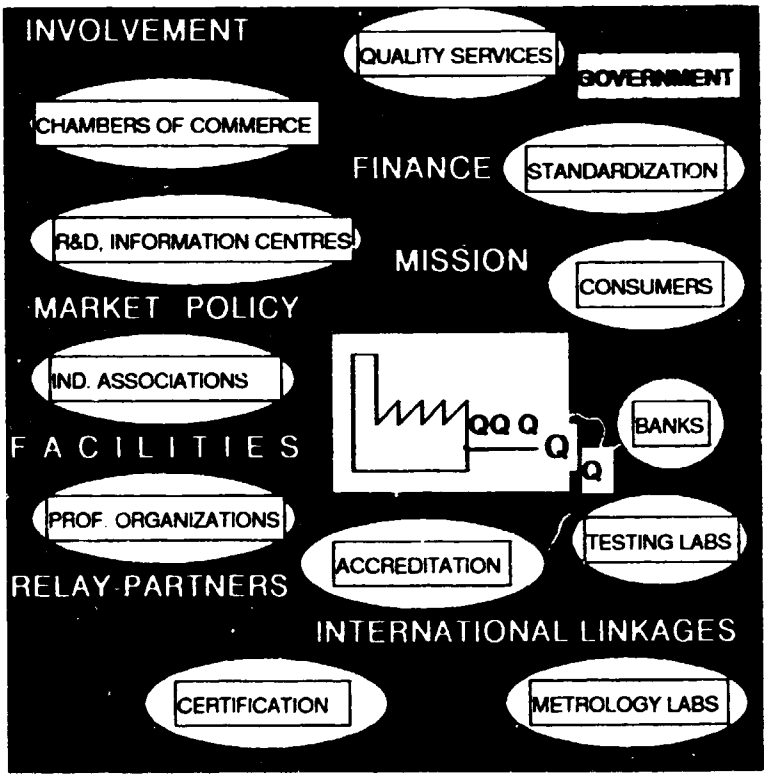
If we consider that **the company level is the first level** of a national quality system, we can define a **second level of the system where the immediate collaborating actors of quality promotion and implementation** appear.

- Banks and financial partners must be confident in companies implementing quality management systems, showing clear strategies and objectives... even if they take risks! to take risk is also part of the entrepreneur's job.

- Professional organizations should stimulate quality promotion in their branch, create quality labels, negotiate governmental assistance.

- Associations of industrialists should share experiences and knowledge.

- Chambers of Commerce and Industry, should play a leader role in the promotion of quality.



- Consumer associations should exist, demanding quality improvement, collaborating for identification of consumer needs and participating in the establishment of regulations by government authorities.

- Research and development centres, information centres, Universities, Engineering schools, training institutions and laboratories should be able to provide services to industry in the fields of technologies, machine tools, computers, automation and new materials, and technology transfers. National and international data bases should be easily accessible.

- Industries should be able to find advisers, consultants and services in quality control disciplines, equipped with appropriate training materials. Specialized education systems should provide national specialists to be employed in the enterprises.

- A national standardization body should help industry in defining technical specifications, establish harmonized quality control practices, provide information on national and international standards, promote quality and standardization at the enterprise level, support national industries in international negotiations, establish mandatory quality requirements for products addressing health, security or national strategies, and establish a widely disseminated conformity marking system.

- Testing laboratories should be able to establish the conformity of products with national and international standards, participate in standardization works, as well as to provide testing and advisory services to enterprises.

- Metrology laboratories should guarantee adequate calibration of industrial, scientific and legal measuring instruments. Their standards should be linked to international standards.

- Accreditation bodies should guarantee that testing and metrology laboratories perform tests and calibrations under the best conditions of quality assurance, according to internationally recognized practices.

- Enterprise certification bodies should be able to deliver internationally recognized certificates proving the compliance of enterprises' quality assurance systems with international standards.

All these actors have the primary mission to provide the enterprises with "a maximum of comfort". They are what we could

call "external facilitators" for quality improvement. In that field, we believe that a national consensus must be found among economic actors, as well as support from the nation itself. One of the best examples of national quality awareness comes from the Kingdom of Morocco where the government does not hesitate to speak of the recent economic history in the following terms: " the 60's were the years of public investment, the 70's the years of private investment, the 80's the years of exports, the 90's will be the years of quality improvement".

We can therefore define the **third level of a national quality system: National Policy.**

Here also the quality environment as described above as the second level depends greatly on political options taken by the government. Clear guidance must be given to the country in order to secure stable development conditions.

- As a first step, a strong involvement from the highest authorities must be seen. It looks like quality management in a company, where top management must commit itself fully in the system.

- The financial policy will foresee measures to promote investment in quality; financial assistance and subsidies could form part of this promotion, as well as preferential modes of taxation.

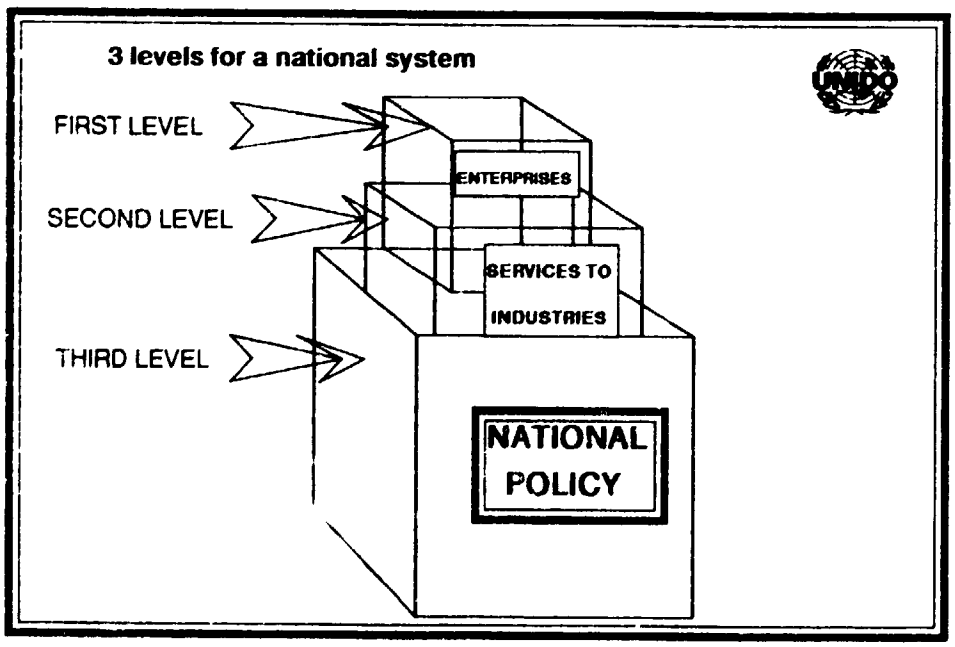
- Public service missions have to be harmonized in order to avoid overlapping of duties among different Ministries. Civil servants should be trained on quality issues and establish quality improvement projects for themselves within their departments or divisions. Official technical controls can utilize quality tools to improve productivity and show examples to the private sector. A national governmental structure should be in charge of the coordination of all quality related actions like standardization policy, national quality promotion, international cooperation, metrology calibration chains, testing and certification policies.

- A market policy must lead to a total control of open markets in terms of quality of local or imported products and border control but not fall in the realm of protectionism which has never helped any economy. A product policy must therefore define priorities for regulation, standardization and quality control and lead the whole quality promotion programme. Consumer protection should be the highest priority. Public markets could experiment recourse to quality specifications, mandatory standardization, testing certificates and certification.

- A policy of means must support the national programme by providing the national system with appropriate metrology, testing, standardization, research and development, as well as training facilities. This must include establishment of such services but also the determination of necessary maintenance costs. Financial support must be foreseen for the implementation of the national promotion programme (quality awards, television spots, product surveys, training, study tours, pilot projects etc.).

- Reliable partners must be mobilized to participate in the national effort.

- Particular attention must be paid to international linkages and relations in order to assure a speedy international recognition of the national quality system which had been established. This is a key success factor for a country wishing to export especially to highly regulated markets like the EC.



2. MANDATE OF UNIDO

Mechanisms of assistance

UNIDO's mandate is to promote and accelerate industrial development in developing countries. In order to respond to the countries' demands, UNIDO has developed a fully integrated programme i.r.o. quality in line with the recommendations of all international organizations dealing with the subject matter (UNIDO has close cooperation with the International Standardization Organization (ISO), the Organisation Internationale de Metrologie Legale (OIML), the International Trade Centre (ITC), etc.). However, this programme emphasises the role of Quality as a necessary support to technology and technology transfer.

The world has seen with very vivid results - especially during the past twenty years - the phenomenal socio-economic progress achieved by enterprises, corporations, and nations who have put Quality at the right place in their development process. Continued technical assistance in that field is seen as vital to an increasing number of developing countries with varying needs.

All the entities belonging to the industrial sector can request our assistance, public as well as private.

In our field, most of our counterparts are the Ministries of Industry or of Economic Affairs, Standardization bodies, Metrology or Testing Laboratories, but nothing forbids us to work directly with entrepreneurs or professional organizations through the government.

The request for assistance must be submitted to UNIDO through the local UNDP office which checks that this request is approved by the coordination authorities of the country in question and that the request is compatible with on-going or envisaged bi- or multi-lateral cooperation. Each request must be as detailed as possible in order to facilitate UNIDO's formulation and evaluation exercises. In many developing countries a UNIDO Country Director (UCD) or a Junior Professional Officer (JPO) remains at disposal for advice and assistance in establishing requests.

Once the projects are properly formulated and justified, the project documents go through an appraisal and approval process to verify the compatibility of project elements with UNIDO guidelines for technical assistance projects, including the proper and optimal utilization of resources.

Now, the most critical point is funding. Once the internal process is completed, UNIDO establishes contacts with pre-identified funding institutions or donor countries.

UNIDO programmes in these disciplines don't forget the Quality related dimension of technology. Too often, especially in developing countries, there is a lack of understanding of the global aspect of technology and technology transfer, and too little importance is attached to basic support capabilities needed. Quality is too often overlooked or taken for granted in the transfer and acquisition of technology. The proper approach to quality in acquisition of technology, has a number of benefits beyond quality of products and services; (a) increased productivity; (b) reduced costs; (c) improved marketability; (d) lower consumer prices; (e) improved delivery and availability; and (f) improved management of enterprises. Together, these benefits result in ECONOMIC PROSPERITY.

UNIDO has its own funding possibilities, using voluntary contributions of member states or the regular budget allocated for special purposes. Quality related programmes and projects generally need relatively large budgets and are most of the time in line with United Nations Development Programme (UNDP) country programmes, so that most of the QSM projects of UNIDO were until now funded by UNDP.

Programmes and projects

The type of UNIDO's assistance depends on each country's request and on each given situation. The projects might address the above mentioned three levels of the national system: the enterprise, the support services to industry, and the national policy.

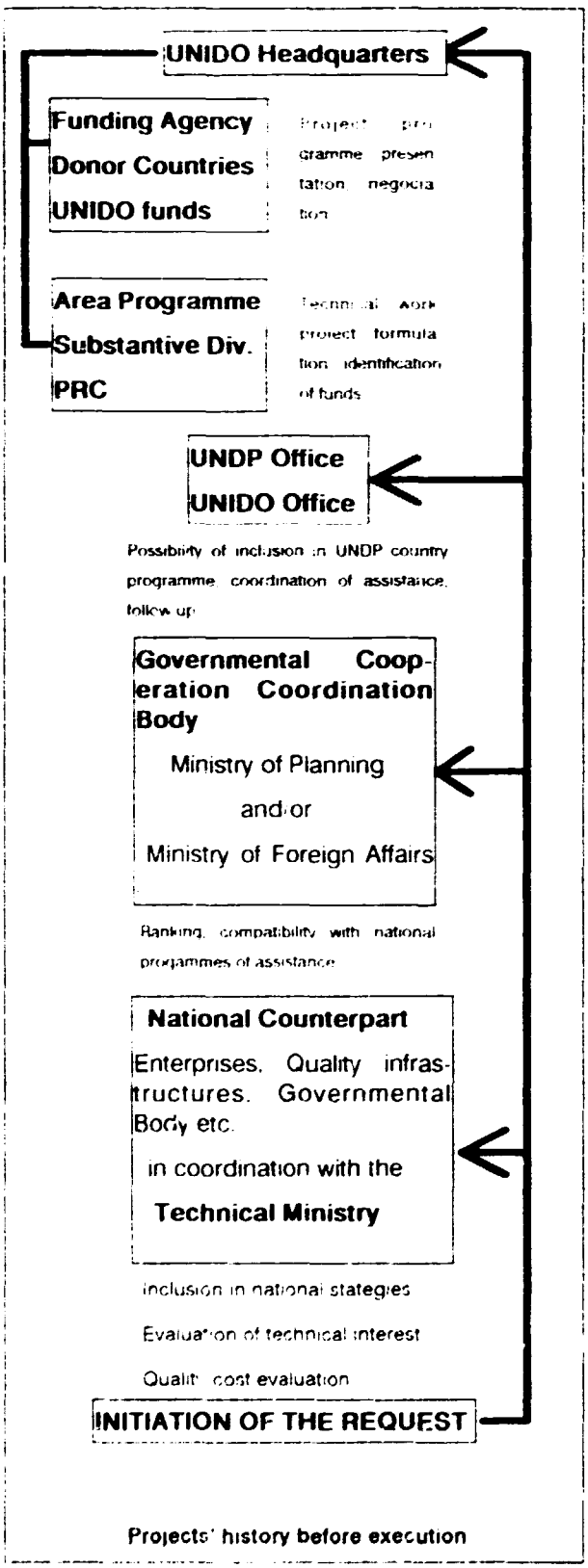
Addressing the three levels of a national system

In some countries it happens that UNIDO's assistance is requested to review the whole national system and determine priority areas of intervention from enterprise level to the national policy.

In Morocco for instance, UNIDO was requested by UNDP to formulate an entire national programme on quality issues. This was the result of a 2 year process engaged within the country in cooperation with national authorities involved in the quality system, but also with major bi-lateral cooperation and the World Bank which extended the study to technology aspects. The UNDP/UNIDO project DP/MOR/86/015 "Standardization and Promotion of Quality" largely contributed to the study, addressing special issues like testing laboratories or quality of food as well as strategic issues like implementation of standards, promotion of quality, policy coordination and product certification.

The study of the overall system came to the establishment of a programme of actions constituted by 17 projects. All these projects could not be funded by UNDP, neither by bi-lateral cooperation. But the important thing was to have a clear picture of what was suitable for the country. Therefore discussions with all parties involved where held in order to select accurate problems to be addressed with a priority ranking.

So, from a programme design exercise, we came to formulate a project that is not at all in line with the initial request of the government. This is amazing, but the government expressed its satisfaction as in no case UNDP could accept the initial orientation. However, other donors, being assured that UNDP addressed one particular part of the whole programme, were convinced by UNIDO and the government that the initial request was not sound and adequate. Another interesting lesson of this programming exercise was the highest interest expressed by the private sector once it was associated with the study. In the particular case of Morocco, the three levels of the national system were addressed because apparently the donor institutions wanted to be assured of the orientations of the governmental policy in the field of quality. Subs-



sequently, particular projects were designed all fitting with the programme objectives by different institutions in cooperation with the government coordination unit.

Addressing the second level of the national system

In other countries it might happen that the national system development is already planned and priorities are established. In that case UNIDO's role is to focus on technical aspects of particular projects.

For Zambia (DP ZAM 88/009 " Establishment of metrology facilities and laboratory accreditation scheme at Zambia Bureau of Standards"), for instance, UNIDO was requested to focus on metrology matters and to address particularly the area of mass and length calibrations in order to provide the country with a calibration laboratory designed according to international standards.

In the case of Togo (DP TOG 86/013 "Standardization and Quality Control"), the project was particularly difficult to implement in the sense that UNIDO was requested to establish a national standardization body from scratch. This kind of project is known as one of our "bestsellers" Although UNIDO executed successfully numerous projects of that type before, we always feel uncomfortable when we start its execution. As a matter of fact, the success of the project depends totally on the support of the government during its implementation and after. Each stage is a challenge: to get the necessary staff, to get the appropriate buildings, to get the cooperation of existing testing laboratories etc. Most of the time, additional funds must be secured to finish specific activities. In that case, UNIDO's role is more to act as a coordinator or a facilitator than to act as a pure technical assistance supplier.

Addressing the first level of the national system

It might finally happen that UNIDO delivers a very specific kind of assistance to a particular company. The project SI/SEY/88/802 "Improvement of Quality of Paints", for instance, is helping a producer of paints to improve its production in the Seychelles. This project provides assistance at the production process level, but also establishes linkages with the customers in order to show to the national authorities that customer satisfaction is a basic goal for quality improvement. This project is executed through the Seychelles Bureau of Standards.

Promotional Activities

Since UNIDO is expected to approach the problems of standardization and quality control in a more integrated fashion in order to ensure that technological development is linked to the actual industrial production and, furthermore, at this stage to make developing countries aware and to train them on the appropriate application of ISO 9000 quality management techniques, a Regional Programme on Promotion of Industrialization through Standardization and Quality Control was prepared. It was considered that this UNIDO programme would contribute to accelerating the process of establishing an industrial base and infrastructure in the developing countries, and to make government officials, entrepreneurs, managers and middle class workers more aware of techniques in the field of standardization and quality control. This would allow them to be prepared to participate in the world market.

In order to address the problem and explain the development of a well-functioning standardization and quality control system in developing countries, the Regional Programme on Promotion of Industrialization through Standardization and Quality Control has considered the organization of a sequence of seminars, through which policy makers and middle management levels could participate and discuss the significance of standardization and quality control and their different tools as support activities which should be included in their policies and plans. Moreover, the seminars are providing the opportunity for the participants to become familiar with the importance of the audio-visual training materials as a scheme for promoting and accelerating standardization and quality control.

The main considerations of the programme are:

-to promote the most important elements of standardization, quality control and metrology activities among developing countries and to create a consciousness in the governments about the importance of them, especially for the industrial production, the economy of the country and the consumer protection;

-to show the governments the need for the coordination of these activities at a national and regional level, and later on at an international level, and the benefits that could be derived from such a coordination;

-to create and or increase the awareness in the public and private sectors in developing countries of the advantages of the standardization, quality control and metrology;

-to mobilize and train human, technical and financial resources to cooperate in these areas;

-to create awareness of the necessity of basic policies and the required minimum legislation to establish a standardization, quality control and metrology system and its application in the developing countries;

-to promote and train the adequate application of ISO 9000 standards in preparation of the export process.

Comparative advantages of UNIDO

The evident comparative advantage of UNIDO refers to the huge quantity of technical assistance projects that UNIDO executed through the years since 1967. But this is not, to our point of view, the best guarantee for the quality of the projects as, as stated before, each project is new in its concept, and as each country has its particularities and its special expectations. Moreover, the techniques like in all technological fields are progressing fast; innovative approaches might rapidly become classical and or outdated.

The real comparative advantage of UNIDO refers to its unique position to bring a truly international perspective and approach to this kind of technical assistance. The international, multilateral organizational structure of UNIDO provides unbiased, no-strings-attached advisory services. UNIDO is supported for that by an extensive database, which contains rosters of experts and contractors able to deliver the required up-to-date technology or services. The database contains also rosters of proven training and education centres in all parts of the world, with which UNIDO has well established contacts. Also incorporated in UNIDO is an experienced equipment procurement organization that is able to recommend cost performance-effective instruments and equipment.

The Thai project DP/THA/89/002 "Strengthening of the Metrology and Laboratory Accreditation Programme" illustrates this fact well. The initially approved project document foresaw not less than 16 men-months of international high level expertise and a total budget of US $ 99,000 for training abroad. When the time came for the selection of experts, the UNIDO backstopping officer realised that the project could be implemented according to two different approaches. The first one, more classical, should have led to the selection of experts from the UNIDO roster, independent from their nationality and the organization of their respective national metrology systems. The second one, resulting from experience in laboratory accreditation, should have advised to subcontract the biggest part of the project to a well established, internationally recognized metrology institution. Neither the first approach, nor the second one satisfied UNIDO's wish to provide Thailand with the best assistance. The decision was taken at UNIDO to offer the Thai authorities the broadest choice by requesting most of internationally recognized metrological institutions to propose a detailed bid for all or part of the project expertise and training components according to their capabilities. This request resulted also from UNIDO's experience in the field of metrology, for which it was almost sure that the most specialized laboratories of the world could not devote so much time to expertise and training. This approach was proposed to the field and after a considerable consultation we could offer our counterparts a choice between five teams of experts; one team from Czechoslovakia, one team of independent US experts, one team from the National Institute of Standards and Technology (NIST, USA), one team from the French national Metrology network, and one from UNIDO's roster. Except for the Czech and the roster teams, the proposals we received didn't meet the initial requirements but it was decided to let the Thai authorities exercise the right to choose. Therefore, the Thai national direction of the project was given the opportunity to visit the bidding institutions. Study tours were consequently organized at NIST (USA) and at CERLAB (France) to evaluate the technical offers, to meet the potential experts and to see the proposed training institutions. In so doing, a selection of French and American experts, and training opportunities was made and approved by UNIDO headquarters. Moreover, a study tour to New-Zealand and Australia was organized to discuss the participation of these countries in the project although they indicated that they were not in a position to make initial offers (such as Japan, Germany, and some others). In that case, we can emphasise the fact that the project's authorities had all possible control on the origin of the assistance.

In the case of Iran (project DP/IRA/89/034 "Strengthening of Iranian Standard and Industrial Research Institute"), the project foresaw procurement of US $ 150,000 equipment for a pressure metrology laboratory. Initially, this amount was included in the project to permit the Iranians to buy a modern force calibrating machine. Unfortunately, the technology and the performance of the machine which the counterparts wanted was not available from known suppliers under US $ 1,000,000. When others would have forgotten it and provided replacement solutions, UNIDO in accordance with the project, decided to continue its research, and because of very good relationships with Czech experts in that field, another solution was explored, involving our Czech partners. Apparently, Czecho-Slovakia had the necessary technology and expertise to build such a calibrating machine. Several meetings took place at UNIDO headquarters were technical and financial points were detailed and UNIDO convinced UNDP to provide additional funds (US $ 30,000 which were in fact taken from savings on the project) and give Czech companies the opportunity to develop a new machine. Security was taken at the backstopping responsibilities' level by getting the necessary funds to undertake, if required, a third party technical evaluation at the end of the project. The benefits of UNIDO's perseverance, in spite of a long delay in implementation of the projects, are the following:

- project's counterparts are satisfied,

- Czech suppliers were given a chance to develop new capabilities in their country with UNIDO/UNDP participation;

- UNIDO and developing countries will, in the future, have a new competitive supplier for accurate metrology needs.

These two examples offer a better understanding of UNIDO's comparative advantages. But there is still a mission in that field that UNIDO defined for itself: to improve the cooperation among developing countries in order to save large funds and develop expertise and training capabilities in the institutions UNIDO created beforehand. This is a point still not easy to implement as the requests of developing countries are still directed to highly industrialized countries. However, we are developing strategies to address this issue.

3. EVOLUTION OF UNIDO TECHNICAL ASSISTANCE

Classical projects

As explained before, classical projects become very quickly outdated, as the developing world is moving as fast as the developed world, and unfortunately, the latter is not waiting for the former. That is why UNIDO is always attentive to the continued changes in quality issues and trying to incorporate modern concepts into classical projects. For instance the project DP/DC/ALG/90/018 "Control of the quality of industrial products" includes basic governmental regulations and controls, modern concepts of testing laboratory accreditation, as well as promotion of total quality management in the enterprises. This approach satisfies the Algerian Government as time, for Algeria is of the essence. Algeria today will solve its political problems only if economic performance is reached in a minimum of time. Now for UNIDO, the challenge is also open as it is really difficult to mix issues like a regulation system, repressive controls, and ISO 9000 promotion, particularly when the same actors are dealing with these issues. We would not appreciate to see ISO 9000 standards being considered, consequently, by the enterprises as mandatory!!!

A new approach had to be found also for classical projects of establishment of national standardization bodies in least developed countries (LDCs) like Niger, Benin, Djibouti and Guinea. UNIDO funded preparatory assistance missions for those countries, in order to design plans of action and projects to develop national capacities. But once the individual projects were elaborated, it was not possible to find donors for many reasons linked to the status of LDCs. UNIDO therefore imagined a project concept grouping the four countries in a process of step-by-step implementation where key success factors will assure the donors as to the usefulness of the project itself and of further assistance. Still at the concept stage, this project apparently meets a lot of donor requirements. But for UNIDO the question which must be asked when according to donor [illegible] a national QSM system?

Cooperation among developing countries

To find funds to execute technical assistance projects is becoming more and more difficult with the worldwide economic situation. Solutions must therefore be found to decrease the costs of technical assistance. On the other hand, UNIDO should not be satisfied if the institutions and capabilities developed under UNIDO's assistance don't obtain a certain international recognition: recognition is one of the most important issues of the quality question (customer satisfaction, quality assurance, certification bodies mutual recognitions, staff participation recognition in the enterprise etc.). It seems to us that involving developing countries' capabilities in cooperation projects should decrease the prices and lead to international or at least regional recognition. An initiative has been taken in Africa with two studies/proposals, one concerning the establishment of a list of "centres of excellence" in Africa where high quality calibration works can be undertaken, the second concerning the establishment of a regional system of training in the field of QSM [illegible] countries. These [illegible] Africa or [illegible] of back[illegible]

Total Quality Management issue

TQM has become a necessary component of all the UNIDO projects on QSM. [illegible] during UNIDO staff missions [illegible] TQM in every project. Some new projects only address this issue [illegible] the process sometimes lose sight of [illegible] the country has to face with a national system. This situation [illegible] by the effect of a worldwide promotion of Japanese methods that happened to be particularly adapted to international competition [illegible] increasingly active participation of industrial enterprises in the projects [illegible] QSM. The project DP/KEN/90/[illegible] [illegible] Quality Management [illegible] DP/SRI/92/005 "Enhancing Quality in Sri Lanka" and DP/MOR/92/012 "Standardization and Promotion of Quality, phase II" are very good examples of projects on TQM at different sizes [illegible] The projects for Morocco and Sri Lanka were designed very recently and are still not approved.

Quality as a key word for modernization

UNIDO [illegible] Quality for Quality itself. Quality management belongs to a wide industrial process involving at different levels (the three national levels) many components and actors. UNIDO [illegible] leads this organization to propose large programmes in developing countries aiming at the restructuring or the modernization of industrial sectors and subsectors, where quality [illegible] incorporated. For instance, this approach has been developed by UNIDO for a large scale project on "Industrial Modernization of the Capital Goods Sector in Latin America" (US/RLA/90/001). This US $ 5 000 000 project addresses 10 countries and enjoys the financial support of Venezuela, Italy, Switzerland, France, Japan and UNIDO itself. The immediate objective

is to assist in the modernization of small and medium scale industries mainly by introducing strategic management techniques, Total Quality Management, industrial planning and equipment automation concepts. It will be obtained through the execution of three interrelated subprogrammes:

- Entrepreneurial advice: 10 pilot enterprises and their main suppliers by country

- Training, provided to professionals from the pilot enterprises, industrial associations and technology and research institutions. Initially at national level, subsequently at regional level in order to train selected future trainers

- Strengthening of institutions: support will be provided to national technological institutions to promote joint research and development on topics related to strategic management, Total Quality Management and industrial automation. Special service centres will be created at national and regional level in order to support industries in the implementation of modernization

This project is typical of the new approach of UNIDO projects, trying to make developing countries benefit from the large range of expertise of UNIDO's staff in global projects instead of proposing small scale projects more or less independent from the others. But once more, it depends on funding possibilities and on the capabilities of recipient governments to coordinate such big programmes at their level, and in cooperation with neighbouring countries in the common interest.

Influence of ISO 9000 standards on UNIDO OSM programme

Nobody will deny the worldwide success of ISO 9000 series standards, considered by ISO itself as a "bestseller". Effectively, these standards represent a major success. Imagine the same text, applicable in the whole world, to all industries from chemicals to mechanics, from software to heavy industry!

UNIDO is therefore very attentive to the development of the phenomenon of third party certification referring to ISO 9000 standards. But if UNIDO supports all kinds of training or expertise activities dealing with the know-how on the subject, it is also very attentive on the understanding of the use of those standards. In every discussion we have on the subject with national counterparts particularly when we address the national system, we put emphasis on what the ISO 9000 ARE NOT more than on what ISO 9000 are. Unfortunately, we are faced to a lot of confusion on the subject in developing countries, and we try to avoid that these standards might be interpreted as new technical barriers raised by industrialised countries. This is a role UNIDO gave to itself to more or less demystify the issue and promote real policy interests (and not obligations) of third party certification according to Quality Assurance international standards, including the beneficial impact of the certificate on personnel motivation and recognition. To play that role we try:

- first, to explain the difference between Quality Assurance and Quality Management, by putting emphasis on customer satisfaction, quality improvement and costs, and innovation, as opposed to quality conformance as an end in itself;

- then, to recall the history of third party certification and the initial client supplier dimension to it;

- finally, to evaluate very seriously the requests for the establishment of a national enterprise certification system in the context of future mutual recognitions with foreign countries.

These reasons explain why we do not at the moment have large scale programmes addressing only the issues of ISO 9000 standards implementation and third party certification. These issues are addressed through projects on quality management or on quality promotion with a maximum of care since bad use and abuse of ISO 9000 standards can lead to regrettable costs and waste at the industrial level or at the level of newly established national certification bodies.

ANNEXES

In order to illustrate the present paper, selected project sheets are attached for easy reference and description of concrete activities undertaken by UNIDO in technical assistance projects. All the projects are simply detailed in terms of objectives, results and budgets. They are all on-going or about to be approved ; these examples give therefore an up-to-date picture of the present UNIDO programme.

Project sheets on:

DP/ZAM/88/009

DP/TOG/86/013

Si/SEY/88/802

DP/THA/89/002

DP/IRA/89/034

DP/DC/ALG/90/018

DP/KEN/90/028

XA/EGY/91/602

DP/SRL/92/005

DP/MOR/92/022

Project sheet

DP/ZAM/88/009 "ESTABLISHMENT OF METROLOGY FACILITIES AND LABORATORY ACCREDITATION SCHEME AT ZAMBIA BUREAU OF STANDARDS

Objective 1: To develop Zambian Metrology Service

RESULTS

1. A development plan for metrology in Zambia
2. An equipped and functioning measurements standards laboratory and calibration centre
3. A core of staff trained in Metrology to carry out the work of the laboratory and calibration centre
4. An established linkage of Zambia's metrology standards to international standards through a third country
5. National metrology standards and a system to develop them

Objective 2: To develop a functioning testing laboratory accreditation system

RESULTS

1. A development plan for the accreditation system
2. Training of staff in the field
3. Establishment of the accreditation system with related manuals and procedures

Objective 3: To draft a national plan for the development of the institutional infrastructures of standardization

RESULTS

1. A national plan

FINANCIAL ELEMENTS: Total budget US $ 440,000 for 4 years:

- Personnel US $ 158,000
- Training US $ 68,000
- Equipment US $ 202,000
- Sundries US $ 12,000

Project sheet

DP/TOG/86/013 "STANDARDIZATION AND QUALITY CONTROL"

Objective: To reinforce the capacities of the Ministry of Industry in order to reach the objectives defined in the field of standardization and quality control

RESULTS

1. Reinforcement of the "Conseil Superieur de la Normalisation" Work plan for the 3 coming years. Supply of appropriate financial means.

2. One to three metrology standards written, adoption of the international unit system as a legal system, legal metrology, trained staff in legal metrology, legal metrology laboratory, performance of calibrations.

3. Two to ten standards in the field of industrial cultures, official regulation, trained technician, equipped laboratory, performance of quality controls.

4. One to three standards in the field of animal origin food, official regulation, trained technician, equipped laboratory, performance of quality controls.

5. Two to ten standards in the field of agricultural products, official regulation, trained technician, equipped laboratory, performance of quality controls.

6. One or two standards in the field of building materials, official regulations, a study tour report on regional practices, performance of quality controls.

7. One to three standards in the field of drinking water, one to three standards in the field of soft drinks, official regulation in these fields, three trained technicians, performance of quality controls, a report on a study for the certification of soft drinks.

8. One to three standards in the field of pesticides, official regulation, three trained technicians, a report on a possible infrastructure to perform usual quality controls.

FINANCIAL ELEMENTS: Total budget US $ 873,000 for 4 years:

- Personnel US $ 365,000
- Training US $ 214,000
- Equipment US $ 238,000
- Sundries US $ 57,000

Project sheet

SI/SEY/88/802: "IMPROVEMENT OF THE QUALITY OF PAINTS"

Objective: Identification and rectification of problems of quality for varieties of paints produced by PENLAC as well as establishment of standards for paints and analytical capabilities.

RESULTS

1. Analysis on the complaints of users and recommanding solutions to be urgently taken in order to improve the quality of paints.

2. Training of two staff of the Seychelles Bureau of Standards on paint analysis techniques.

3. Quality standards for paints and solutions in the production process to ensure that all paints meet the above mentioned standards.

4. Advice on the quality of paints including: quality standards and quality control organization at the three levels of production, chemical analysis and market survey.

FINANCIAL ELEMENTS: Total budget US $ 101,000 for 1 year

- Personnel US $ 18,000
- Subcontract US $ 81,000
- Sundries US $ 2,000

Project sheet

DP/THA/89/002: "STRENGTHENING OF THE METROLOGY AND LABORATORY ACCREDITATION PROGRAMME"

Objective 1: To strengthen the capabilities of the Department of Science Service (DSS) to establish maintain primary standards, secondary standards and working standards in the fields of reference materials, mass and mechanical measurements and acoustics.

RESULTS

1. Long term development plans for establishing and or improving areas of standards coverage by DSS along with recommandations for establishing expanding improving traceability systems with international requirements. The recommendations will be in line with assessed industrial needs.

2. Three operational laboratories including trained staff both abroad and on the job for reference materials, mass and mechanical measurements and acoustics, which are able to establish maintain standards (primary, secondary, working), within DSS as well as in metrological, product testing laboratories and at the working floor.

Objective 2: To assist DSS in establishing the accreditation network for metrological laboratories in Thailand, and to enhance DSS capabilities to operate manage the network.

RESULTS

1. Assessed metrological laboratories to be included in the network, specific measures to be taken for these laboratories prior and or after inclusion in the network, as well as recommendations for long term planning to develop the national measurement system through the network in the most effective way.

2. A report (approved by the National Committe on Metrology), comprising recommendations for rules, regulations and operation management system of the accreditation system for the network.

3. Three DSS officials, at the decision making level, familiar with the functioning and setting up of accreditation systems for metrological laboratories abroad.

4. Four trained staff (on the job and abroad) in reviewing monitoring mechanical and electrical measurement laboratories, and in providing extension services to network members both for accreditation purpose.

FINANCIAL ELEMENTS: Total budget U.S.$ 418,000 for 2 years:

- Personnel U.S.$ 205,000
- Training U.S.$ 99,000
- Equipment U.S.$ 109,000
- Sundries U.S.$ 5,000

Project sheet

DP/IRA/89/034: "STRENGTHENING OF IRANIAN STANDARD AND INDUSTRIAL RESEARCH INSTITUTE"

Objective 1: To upgrade the capabilities of the mechanical metrology division.

RESULTS

1. A fully equipped and upgraded mechanical metrology division capable of using:

- its existing capacities with full efficiency and capable of transferring the accuracy of the basic standards of the international units to the standards of the other industrial and research centre in the field of force measurement

- a force calibrating machine which would constitute a national reference

- additional new equipments purchased and installed with the existing equipment at the force and length calibration rooms at the mechanical metrology division.

- in-house training provided to the personnel in the fields of dimensions, volumes, mass, forces and pressures and four staff trained in the relevant field abroad.

Objective 2: To upgrade the capabilities of the electrical electronic metrology division, to facilitate improved services in the field of electrical metrology.

RESULTS

1. A fully equipped and upgraded electrical electronic metrology division capable of using:

- its existing capacities and transferring the accuracy of the basic standards to other institutions in the field of electrical metrology

- technical specifications and primary standards established to constitute a national reference in electrical measurement

- additional new equipment purchased and installed with the existing equipment located on the second floor of the electrical metrology laboratory

- in-house training provided to the personnel in the field of DC and AC and three electrical personnel trained in the relevant field abroad to facilitate operation and maintenance of the existing equipment

Objective 3: To draw up a medium term plan of action 1991-1995 in order to enable the government to decide on the future programme of the ISIRI's centre .

RESULTS

1. A five year programme including a plan of action to implement the programme

FINANCIAL ELEMENTS: Total budget US $ 470,000 for 3 years:

- Personnel US $ 182,000 - Equipment 201,000
- Training US $ 82,000 - Sundries 5,000

Project sheet

DP/ALG/90/018: "CONTROL OF THE QUALITY OF INDUSTRIAL PRODUCTS"

Objective 1: To upgrade the capacities of the "Centre Algérien du Controle de la Qualité et de l'Emballage" (CACQE) in the field of quality control regulation.

RESULTS

1. CACQE and Ministry staff trained in the field of management of a regulation system and testing laboratory networks.
2. Harmonization of existing regulation
3. Establishment of new regulations in the fields of textile labelling, leather and shoes, security of electrical and gaz equipment, and toys and plastics.
4. Relevant technical standards adopted
5. 60 inspectors trained on official regulated controls
6. Necessary documentation available
7. Homologation of selected products
8. Technical specifications and controls of toys

Objective 2: To develop a functioning testing laboratory accreditation system

RESULTS

1. Trained network manager
2. Definition of technical needs of related laboratories
3. Development of the accreditation system
4. Establishment of a functioning network
5. training of laboratory managers and technicians
6. Operational laboratories for regulated controls
7. Harmonization of testing procedures within the network
8. Pilot projects for advisory services to enterprises
9. Necessary documentation

Objective 3: Quality promotion at the national level

RESULTS

1. 5 trained quality trainers
2. Promotion actions (public and private sectors)
3. Definition of a promotion programme and training tools
4. 8 training courses on quality management
5. Establishment of an information documentation centre on quality issues
6. Creation of a metrology quality course

FINANCIAL ELEMENTS: Total budget US $ 991,000 for 3 years: + contribution in AD US $ 200,000

- Personnel US $ 523,000 - Training US $ 353,000 - Equipment US $ 273,000 - Div US $ 45,000

Project sheet

DP/KEN/90/028: "TOTAL QUALITY MANAGEMENT IN INDUSTRIAL ENTERPRISES"

Objective: The enhancement of the concern for quality in Kenyan enterprises through the pilot application in a selected number of industries of Total Quality Management.

RESULTS

1. Fifteen enterprises with improved performance due to the adoption of a comprehensive Total Quality Management (TQM) system and provided with

- top management trained to provide overall guidance in TQM application

- middle management trained to implement, apply and measure results of quality planning, control and improvement

- workers trained and motivated to participate, at process and operational levels, in work-team for the improvement of workplace processes and products.

2. A team of 6 national experts trained in Total Quality Management and the Quality Sciences, capable of providing consulting services and training to enterprise management and personnel, and elaborating and implementing national programmes of the Quality Sciences.

3. Evidence of the benefits both financial and non-financial, resulting at enterprise level from the application of TQM and quality systems.

FINANCIAL ELEMENTS: Total budget US $ 577,000 for 3 years

- Personnel US $ 172,000
- Subcontract US $ 150,000
- Training US $ 225,000
- Equipment US $ 25,000
- Sundries US $ 5,000

Project sheet

XA/EGY/91/602: "INTRODUCING TOTAL QUALITY MANAGEMENT TO EGYPTIAN ENTERPRISES"

Objective: To introduce Total Quality Management Control in Egyptian enterprises through a pilot training/consulting workshop in a selected number of industries.

RESULTS

1. Thirty top managers (representing at least ten to fifteen enterprises) trained in the concepts, principles and methodologies of Total Quality Management and Quality leadership.

2. Thirty fourty middle technical management personnel (from at least ten to fifteen enterprises) trained to implement, apply and measure results of quality planning, control and improvement in their enterprise.

3. A report outlining, among others, the observations, recommandations and potential benefits resulting at enterprise level and subsequently at national level, as seen by the team of international experts under the subcontract.

FINANCIAL ELEMENTS: Total budget US $ 50,000 for 1 year

- Personnel US $ 6,000
- Subcontract US $ 44,000

DP/SRL/92/005: "ENHANCING QUALITY IN SRI LANKA"

Project sheet

Objective 1: To establish the infrastructure for and market the technical expertise of SLSI with respect to advisory, testing, training, information and consultancy capabilities.

RESULTS

1. A fully incorporated, registered, and operating Joint Stock Company (or its commercial equivalent) providing services in the field of Total Quality Management and Quality Systems, Laboratory testing and industrial metrology, training in the quality and standardization disciplines, documentation and information.

2. Two managers of the joint stock company trained abroad on organization, operation, programme and marketing of similar companies.

3. Joint stock company provided with basic operational and training equipment.

Objective 2: To extend the services of SLSI to the provincial level

RESULTS

1. Three provincial laboratories established and providing services to the provinces

2. Nine officers trained abroad in product testing and laboratory operation

Objective 3: To provide a quality system assessment, certification and registration scheme for industry and buiseness in Sri Lanka in Accordance with the ISO 9000 series standards

RESULTS

1. A unit established within SLSI to undertake assessment and certification registration to ISO 9000.

2. Twenty lead assessors trained and certified for carrying out assessments, certification, and registration.

3. 25 enterprises registered under the quality system scheme.

4. Memorandum of understanding concluded with an accredited registration body in Europe (I.I.C)

Objective 4: To introduce Total Quality Management-Control in Sri Lanka enterprises through a series of pilot training consulting workshops in a selected number of enterprises.

RESULTS

1. Thirty top managers (representing at least 20 enterprises) trained in the concepts, principles and methodologies of Total Quality Management and Quality Leadership in a two-day seminar

2. Forty middle technical operational management personnel (from at least 20 enterprises) trained to implement, apply and measure results of quality planning, control and improvement in their enterprises

Project sheet

3. Forty key employees (from at least 20 enterprises) trained in the basic tools of process study and improvement and quality circle organization, operation and reporting.

4. Promotion materials outlining, among others, the observations, recommendations and potential benefits resulting at enterprise level and subsequently at national level as seen by the team of international experts.

Objective 5: To strengthen the capacity and capability of SLSI in the area of industrial metrology to provide essential services in measurement and calibration to industry.

RESULTS

1. Six officers trained abroad in measurement and calibration of industrial instruments and equipment.

2. SLSI's Laboratory Services Division provided with measurement and calibration equipment and serving industrial clients with expected increases of 10% per year in the second year and beyond.

FINANCIAL ELEMENTS: Total budget US $ 1,458,000 for 3 years

- Personnel US $ 328,000
- Subcontract US $ 110,000
- Training US $ 304,000
- Equipment US $ 711,000
- Sundries US $ 5,000

Project sheet

DP/MOR/92/022: "STANDARDIZATION AND PROMOTION OF QUALITY - PHASE II"

Objective 1: To introduce Total Quality Managementt in Moroccan enterprises (in particularly SMI) through training consultancy actions in a selected number of enterprises.

RESULTS

1. Thirty top managers (representing at least 20 enterprises) trained to concepts, principles and methods of Total Quality Management and Quality Leadership in a two-day seminar.

2. Forty middle technical management personnel (from at least 20 enterprises) trained to the implementation of TQM techniques in two five-day seminars.

3. Forty key workers (representing at least 20 enterprises) trained to Quality tools, improvement techniques and quality circles organization and reporting.

4. Promotional materials outlining, among others, observations, recommandations and potential benefits resulting from the project implementation at the enterprise level as well as at the national level. These materials will be elaborated by international experts and consultants recruited under the project.

Objective 2: Based on the results of the pilot projects in enterprise, to reinforce the national support system to enterprises for improvement of quality of industrial products and services.

RESULTS

1. Ten trainers consultants trained to the techniques of introducing TQM into industrial enterprises and capable to handle quality seminars.

2. Four quality seminars given to enterprises, economic actors and civil servants.

3. Communication actions to promote the national quality system (Quality day, quality letter, video-tape).

FINANCIAL ELEMENTS: Total budget US $ 526,000 for 3 years:

- Personnel US $ 204,000
- Subcontract US $ 120,000
- Training US $ 72,000
- Equipment US $ 100,000
- Sundries US $ 30,000

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2nd day

SEMINAR ON

ACHIEVING COMPETITIVE QUALITY THROUGH STANDARDIZATION AND IMPLEMENTING QUALITY SYSTEM

SESSION II: QUALITY SYSTEM IN SMALL AND MEDIUM SIZED COMPANY

Quality Control in Small and Medium-size Industries (Case Presentation)

Speaker: Mr. Masatoshi ISHINO
Manager,
Quality Assurance Dept., Toshiba Lighting & Technology Corp.

Quality Control in Small and Medium-size Industries (Case Presentation)

Speaker: Mr. Leo Susilo
Vice President,
PT. Astra International

SESSION III: ISO 9000 SERIES

Significance of Firm registration in Accordance with ISO 9002

Speaker: Mr. Susumu TSUNASAWA
Section Manager,
Quality Control Section, Suzuka Fuji Xerox Co., Ltd.

What is needed for enterprises seeking registration to ISO 9000 Series Standards?

Speaker: Mr. Chikafumi MORITA
Director,
Quality Assurance Center, JMI Institute

26th – 28th, January 1993
The Borobudur Inter • Continental Jakarta

2nd day
Jan. 26 – 28, 1993

SESSION II: QUALITY SYSTEM IN SMALL AND MEDIUM SIZED COMPANY

Quality Control in Small and Medium-size Industries — An Approach for the Improvement of Manufacturing Quality —

by Masatoshi ISHINO
Manager of Quality
Assurance Department
Toshiba Lighting &
Technology Corporation

Introduction

We would like to explain the actual situation of quality control or quality assurance in small and medium-size companies in Japan by outlining our experience. We will be happy if our experience provides you with useful information.

Toshiba Lighting & Technology Corporation (TLT) was established in 1989 by combining the Lamp Division of 100-year old Toshiba Corp., Toshiba Electric Equipment Corporation and Toki Electric. TLT develops, manufactures and sells lamps, lighting equipment and systems and complex (electrical) parts. TLT is manufacturer of total lighting products and concentrates on the concept of "light". TLT is made up of six divisions in accordance with business areas, and five manufacturing plants in Japan. It has approximately 4,100 employees.

Fig. 1. Organization for Toshiba Lighting & Technology Corporation

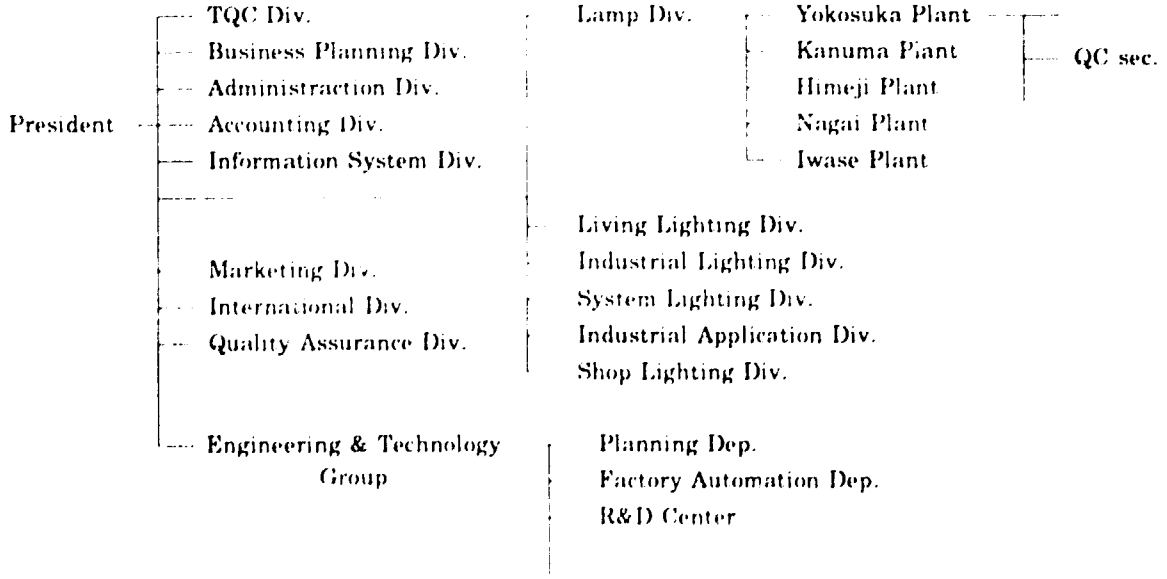


Fig. 2. Management Concept and Quality Policy

Management Concept

TLT is making every effort to contribute to the development of society and a creative and abundant living environment.

Management Policy

1. TLT focuses on consumers and suggests concepts for everyday life using advanced technology.
2. TLT conducts corporate management based on an international vision under the spirit of solidarity and cooperation.
3. TLT aims at developing a worthwhile workplace for our employees based on respect for humanity so that they can maximize their endowments.
4. TLT is making efforts to create a healthy and abundant environment and to harmonize with the global environment.
5. TLT ensures appropriate profit so that it can reward its shareholders, employees and society.

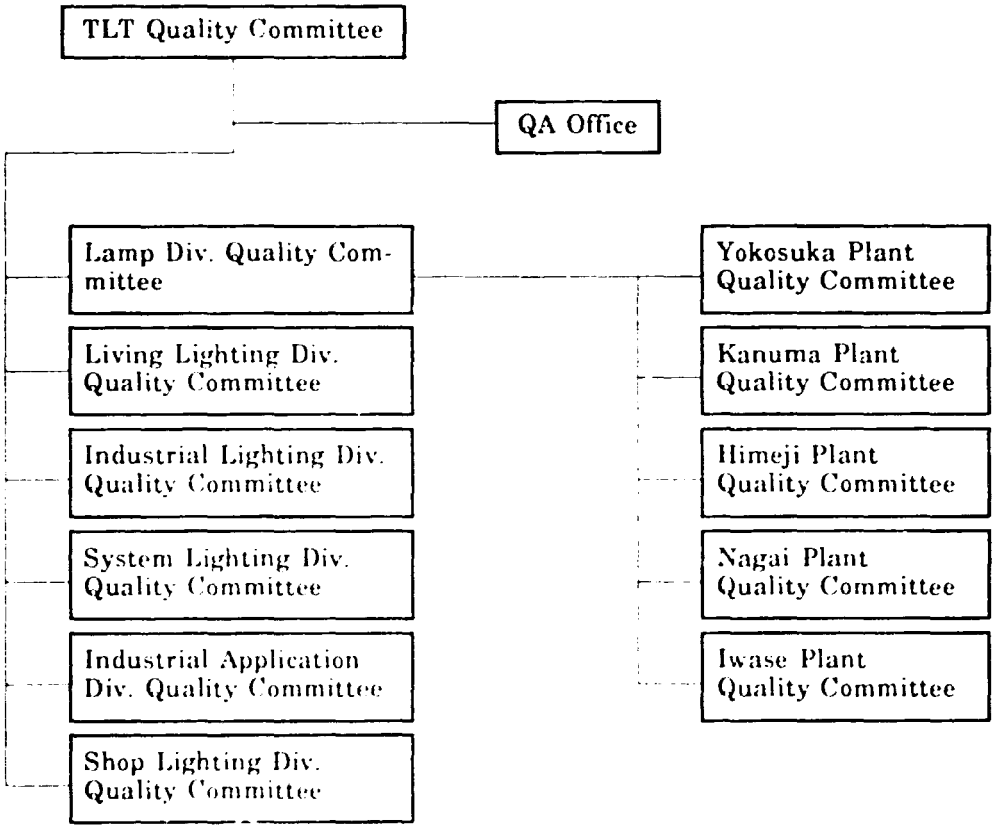
Quality Assurance Policy

1. Always think from the standpoint of customers, and provide products that can satisfy them and be trusted by them.
2. All departments shall fulfill their responsibility for quality assurance effectively and economically through close cooperation.
3. In order to establish a quality assurance system, every process to achieve quality (investigation, development, design, order reception, subcontracting, purchase, manufacture, inspection, packing, shipping, service, etc.) shall utilize all the available methods and measures to remove doubtful elements that may hinder quality assurance. Proper action should be taken before actual damage occurs.

1. Outline of Quality Assurance Activity

The Quality Assurance Activity in TLT has a policy based on our management concept as shown in Fig. 2. To find solutions for problems and to determine policy, we hold Quality Assurance Meetings at different levels, including the entire company, at respective divisions and plants, and at each level of the organizational structure.

Fig. 3. TLT Quality Assurance Activity System



The Quality Assurance Division consists of the Quality Assurance Department and the Plant Quality Assurance Section.

The Quality Assurance Department controls TLT Quality Assurance Activity from the standpoint of the TLT staff. It also collects information on the markets by directly contacting customers. The policy for quality assurance is examined by the TLT Quality Committee or the Quality Committees of respective business divisions.

The Plant Quality Assurance Section is responsible for the quality control of actual production processes in the plants and the quality assurance of manufactured products.

(1) Development of Design Quality

Quality demanded or evaluated by consumers can be expressed as "market quality". After becoming familiar with such a market quality, manufacturers may examine product planning based on their business plan and set a design goal, then start designing new products. The target quality developed through the design process is called "design quality". The quality of the product developed as a result of manufacturing by aiming at achieving design quality is called "manufacture quality".

The purpose of manufacturers is to always know the "market quality" and to enhance "design quality" and "manufacture quality".

Fig. 4 shows the basic steps in the development of new products. The persons in charge of technology quality perform Design Review (DR) several times, as required. The purpose is to appropriately evaluate whether departments are properly executing the product development procedures specified in the quality assurance system. Another purpose is to check whether proper measures are being taken immediately for detected problems. The information on items pointed out during DR, or reliability testing data, are compiled and passed on to the Quality Assurance Department for approval of the results. This process is called "Approval Test System", and is an important checking point in proceeding to the next step in the flow of development of new products.

The important thing in developing design quality is that the Quality Assurance Department should analyze actual information of the market and request the Design Department to achieve the demanded quality of similar existing products in the market. This request should be made before they start designing a new product. Through this process, design engineers can clearly know the points to be noted in the actual use of a product. Based on this process, DR will be implemented by adjusting the details and the checking items, as well as reviewing the safety and reliability of the product and the satisfaction level in the market.

Fig. 4. Basic steps of product development

Step	Details
Planning	Product planning Determining product planning
Designing	Setting the specification Designing
Developing the prototype	Releasing the drawings for the prototype Developing the prototype Evaluating the prototype DR Determination of production DAT
Trial mass production	Releasing the drawings for mass production Trial mass production QAT Transferring the control of mass production to the plant
Mass production	Initial flow control

Fig. 5. Approval Test System

AT type	When to conduct AT
Design Approval Test (DAT)	When development of the prototype is completed, or when the prototype is completed with major changes made in its design.
Quality Approval Test (QAT)	When trial mass production is completed and the production level is to be determined.

(2) Development of Manufacture Quality

In product manufacturing, ensuring a reasonable quality, price and delivery term is an essential mission of the manufacturing department. We must minimize defects from occurring in every aspect of manufacturing work, as well as preventing such defects from occurring. To achieve these goals, we must always ensure that we have quality materials and machines, establish appropri-ate working and measurement methods, and develop a proper working environment. In addition, we must always strive to improve them by controlling the production process.

Key points in achieving this are:

(1) Devise process design, process control and management by visualization.

Take immediate action if trouble or a problem occurs.

(2) Facility control: Set up and implement daily and periodical inspections.

③ Inspection and evaluation: Conform to the principle of separation of administration, legislation, and judicature.

④ Process diagnosis: Identify the problem and implement measures.

⑤ Parts and materials: Work on acquiring quality parts and materials. Implement inspection upon reception of parts and material. Conduct audits of subcontractors.

⑥ Utilization of QC data: Put them together in a graph based on time series analysis.

⑦ QC Circle Activity: Activate small-group activities involving workers through education.

(2.1) Quality Control Standard

We must judge many control items correctly by properly using a variety of methods so that we do not miss important points. TLT uses Quality Control Standard (QCS) by indicating control and inspection methods in the production process together with process diagrams to outline the entire details. This includes control items, the persons in charge, sampling, inspection tools, recording format, destination of action, and the code numbers of related standards.

Fig. 6 shows an example of QCS in the production line of lamps. Fig. 7 shows an example of the QC Sheet.

(2.2) Quick Feedback System

Quick Feedback System (QFS) is for discussing quality problems in the manufacturing process, as well as quality problems in the market so that related people can recognize these problems and find the true cause of them. QFS is implemented on a specified date and time in an open place. Related people, including managing personnel, look at the site and discuss problems in order to take immediate action to prevent them from occurring again; in this way quality can be maintained and improved. QFS allows us to clarify quality problems, identify troubles or problems (quality information) immediately, and give proper instructions for countermeasures.

(2.3) Process Diagnosis

Process diagnosis can be performed at different levels: diagnosis by the plant manager, diagnosis by the Quality Assurance Department of TLT, or diagnosis by the person in charge. We must combine these methods and check the existing system and methods from different angles so that quality can be improved.

Fig. 6. QCS of Bulbs (Ex.)

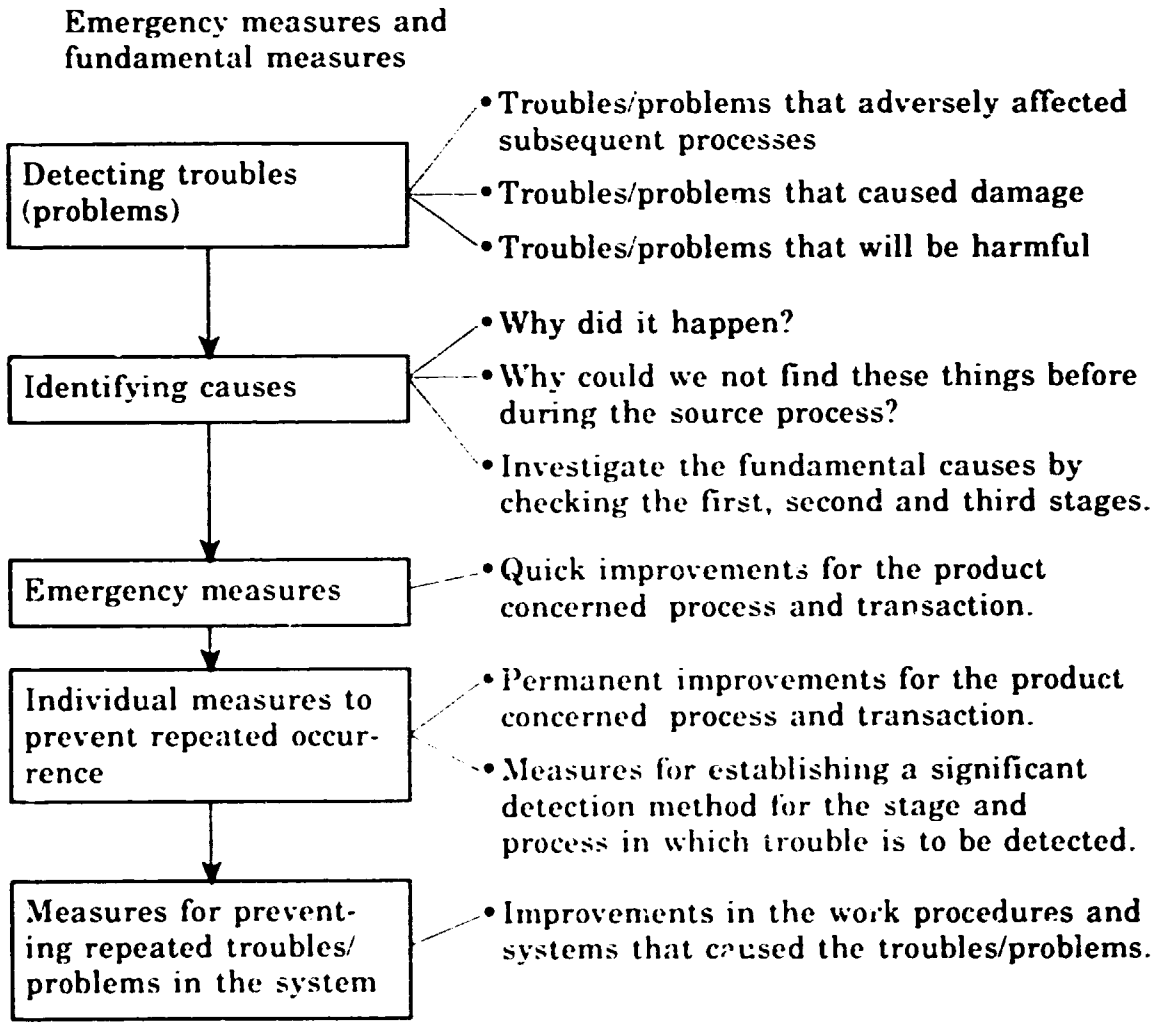
Material (part)	Process diagram	Process name	Control item	Control method			Remarks
				Specification	Sampling	Record sheet	
Mount		Mount check	Dimension	As per work standard	n=5/at start C=0	"	
			Distortion	As per limit sample	n=2/at start C=0	"	
Bulb							
		Seal					
		Seal check	Dimension (seal height)	82.0±1.5 mm	n=36/every 6 months C=0	QC sheet	
			Distortion (strain)	As per limit sample	n=2/at start C=0	"	
		Exhausting (Evacuation)	Line vacuum	As per standard curve	Every 6 months	Record data	
		Evacuation bulb inspection	Lamp vacuum	As per work standard	Total inspection	Summary table	
		Evacuation bulb check	Seal gas pressure	650±20 torr	n=1/at star C=0	QC sheet	
Base							
		Base fitting	Brazing temp.	As per limit sample	n=2/at start C=0	"	
		Check for fitting base	Strength of base fitting	4Nm or above		"	
		Lighting inspection	Current (A)	"	Total inspection	Summary table	
		Finishing inspection	Appearance	"	"	"	
		Lamp check	Dimension (length)	98.0±4.0 mm	n=5/at start C=0	QC sheet	
		Glow inspection	Percent defectives	As per work standard	Total inspection	Summary table	
		Initial characteristic inspection	Total light flux	455 lm or above	n=5/lot C=0		
			Power consumption	40.0 w or less	n=5/lot C=0		
		Overvoltage life inspection	Life time (converted life)	Individual value 750 ~ 2,200 h Mean value 1,000 ~ 1,750 h			
		Construction appearance inspection	Construction, appearance	Minor defect 2.5 % Major defect 0.65 %	JIS Z 9015		

Fig. 7. QCS Check Sheet (Ex.)

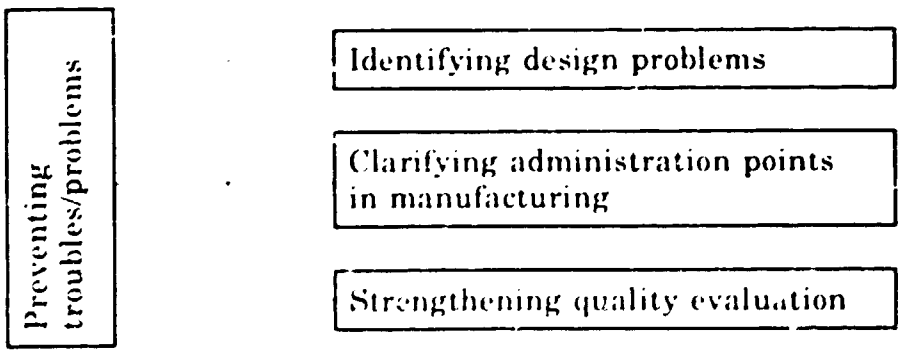
Process	Check item	Control standard	Sampling	Decision
Sealing	Seal depth	By depth gauge	At machine start, n=2	
	Distortion (Strain)	As per limit sample	At machine start, n=2	
	Mold temperature	200±20°C	At machine start	
	Mold blow pressure	Within scope of pressure gauge	At machine start, twice/day	
	Position of seal burner	By ET	At machine start, twice/day	
Exhausting	Tip form	By ET	At machine start, n=2	
	Tip length	By length gauge	At machine start, n=2	
	Leak from base rubber	By leak detector	At machine start, all HD	
	Leak of vertical rubber	By leak detector	At machine start, all HD	
	Pump oil	Higher than specified level	Once/day	
	Center valve oil	Higher than specified level	At machine start, twice/day	
Remarks (Comment)				Checked by
Note) ○ : Good △ : To be improved × : Machine stop adjustment (Enter numerically as far as possible)				

(3) Prevention of Troubles/Problems and Repeated Occurrence

Prevention of reoccurrence



Prevention of troubles/problems



2. Company Rules

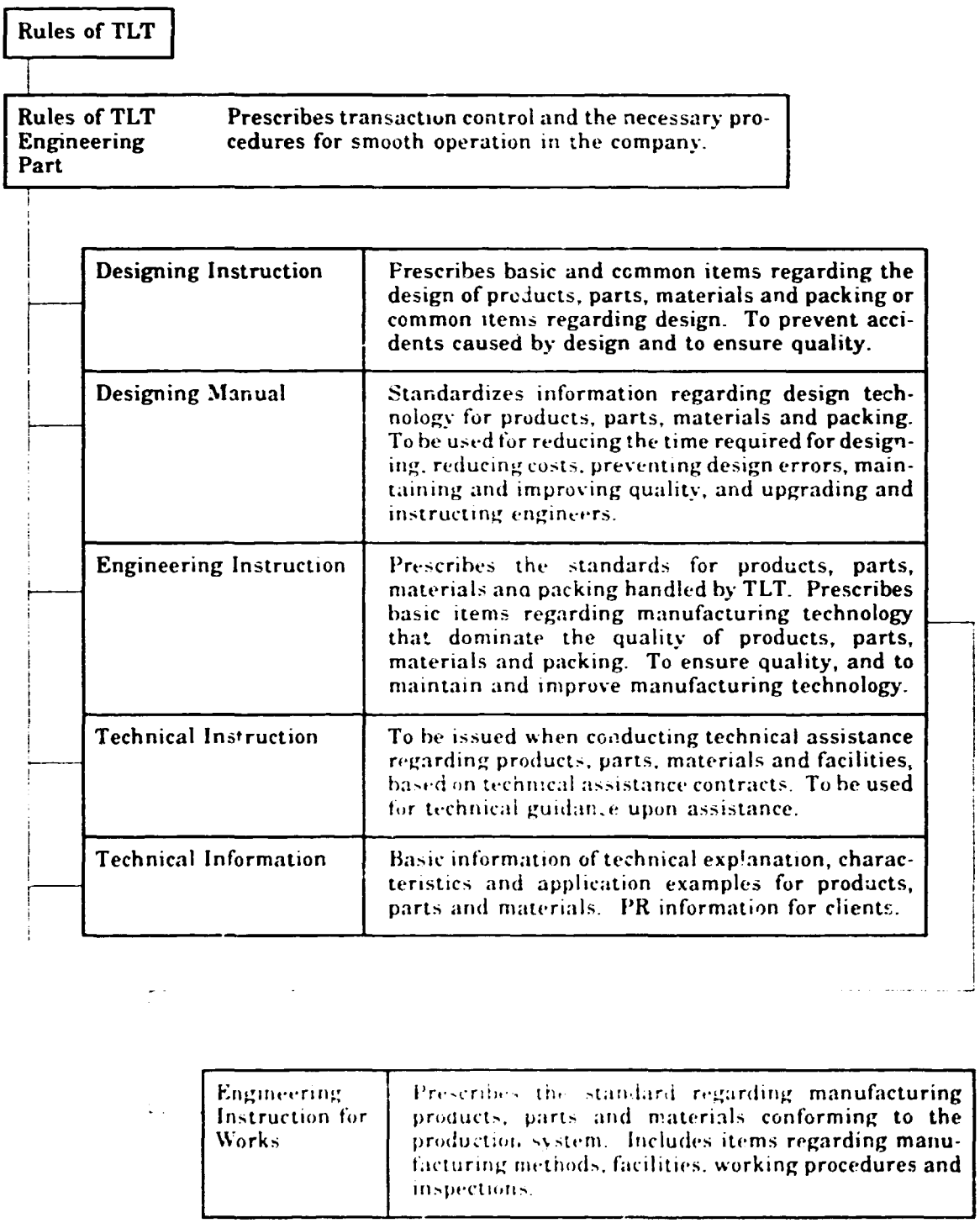
Companies establish rules by transaction control and the necessary procedures, aiming at achieving smooth operation.

These rules are roughly classified into two categories. The first category is general affairs and labor. The second category is technology and manufacture. The second category is further broken into the design instructions and the plant standards for the manufacture of products, parts and materials conforming to the production system.

In these rules, departments/sections responsible for drafting such rules and the person in charge of enactment are specified.

These rules should be reviewed several years after enactment in accordance with the progress of technology or changes in the situation both inside and outside of the company. Of course, changes on a daily basis must always be implemented. The Company Rules must be automatically reviewed after a certain period has elapsed from the date of enactment.

Fig. 8. TLT engineering rules



3. Training

The goal of companies may be the strengthening of the corporate foundation and eternal development. Human resources are directly related to this strengthening and development. In other words, human resources are essential for companies. However, companies cannot always employ the necessary people in the most appropriate manner. Thus, training must be repeated so that existing employees can reach the required level. TLT conducts periodical (fixed) training for engineers, skilled personnel and sales persons. In addition, On the Job Training (OJT) is conducted by higher level or senior staff.

Training for skilled personnel consists of general skills and individual skills for important production processes that are essential for bulb quality. For example, skills for handling a vacuum, exhaust, combustion and glass strain, or skills for special machine tools and the soldering of electronic parts. With the soldering of electronic parts. In particular, we conduct a qualification test and allow only qualified persons to perform soldering.

4. Actual Situation of the QC Circle Activity

This section explains how the QC Circle Activity is implemented at the Yokosuka Plant.

The Yokosuka Plant introduced the Defect Activity in 1965, from which the current QC Circle Activity was derived. In 1976, the Defect Activity was changed into the QC Circle Activity which TLT inherited in 1989. The Yokosuka Plant was formerly the QC Circle Organizer of the Kanagawa area, and is now working on implementing more creative activities through exchanges with other QC Circles.

Activity Features:

1. Activity as part of the TQC Activity
2. Activity involving all departments and people
3. Operational structure of small groups linked with the organization.

Current organization:

	Circles	Members
Indirectly related departments	93	626
Manufacturing departments	86	674
Total	179	1300

Goals of the QC Circle Activity:

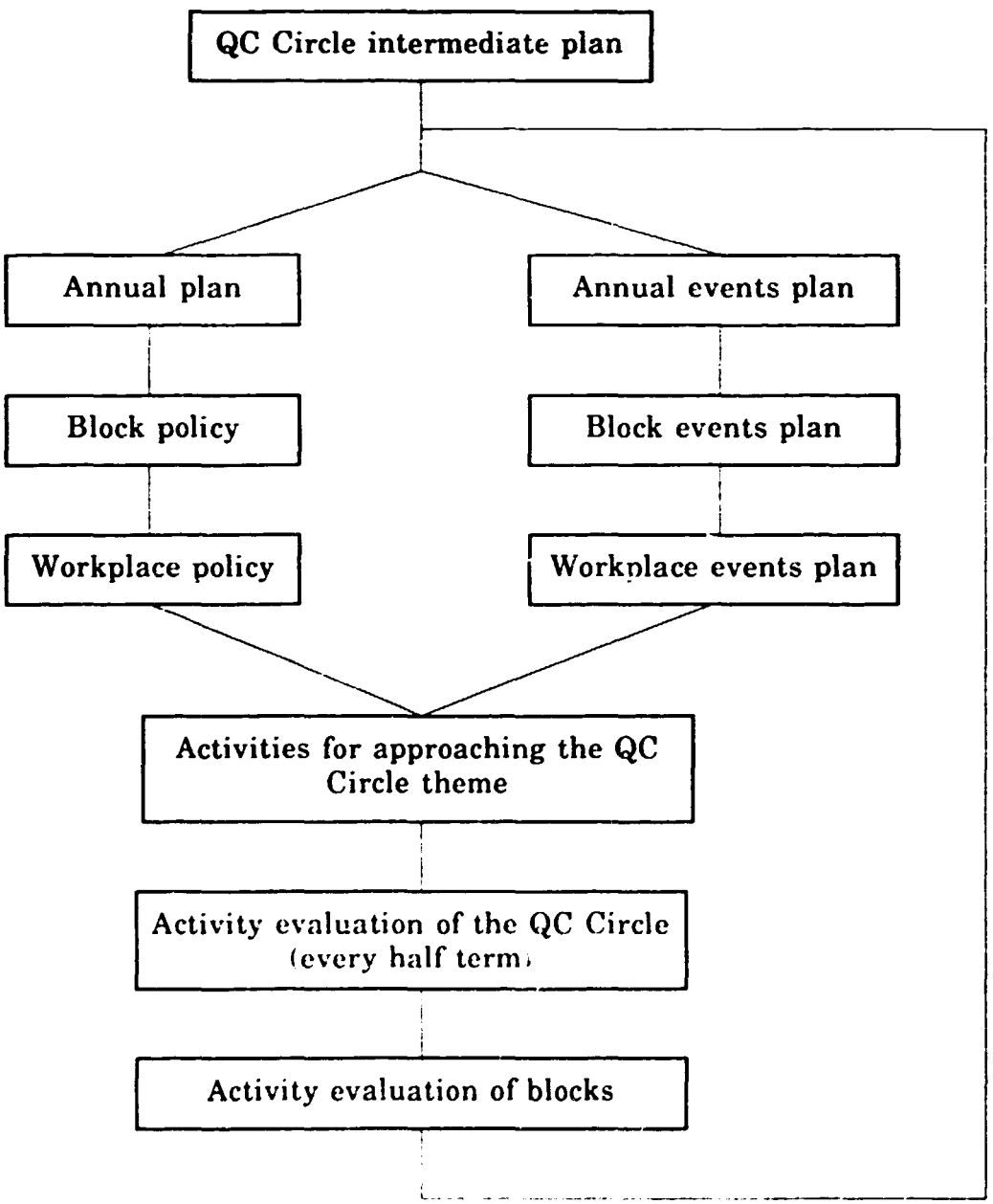
1. Enhance the quality of products, work and individuals through the implementation of basic rules.
2. Master the basic rules and aim at achieving creative activity.

③ Improve the ability of the Circle to solve problems through constant activity conforming to the basic rules.

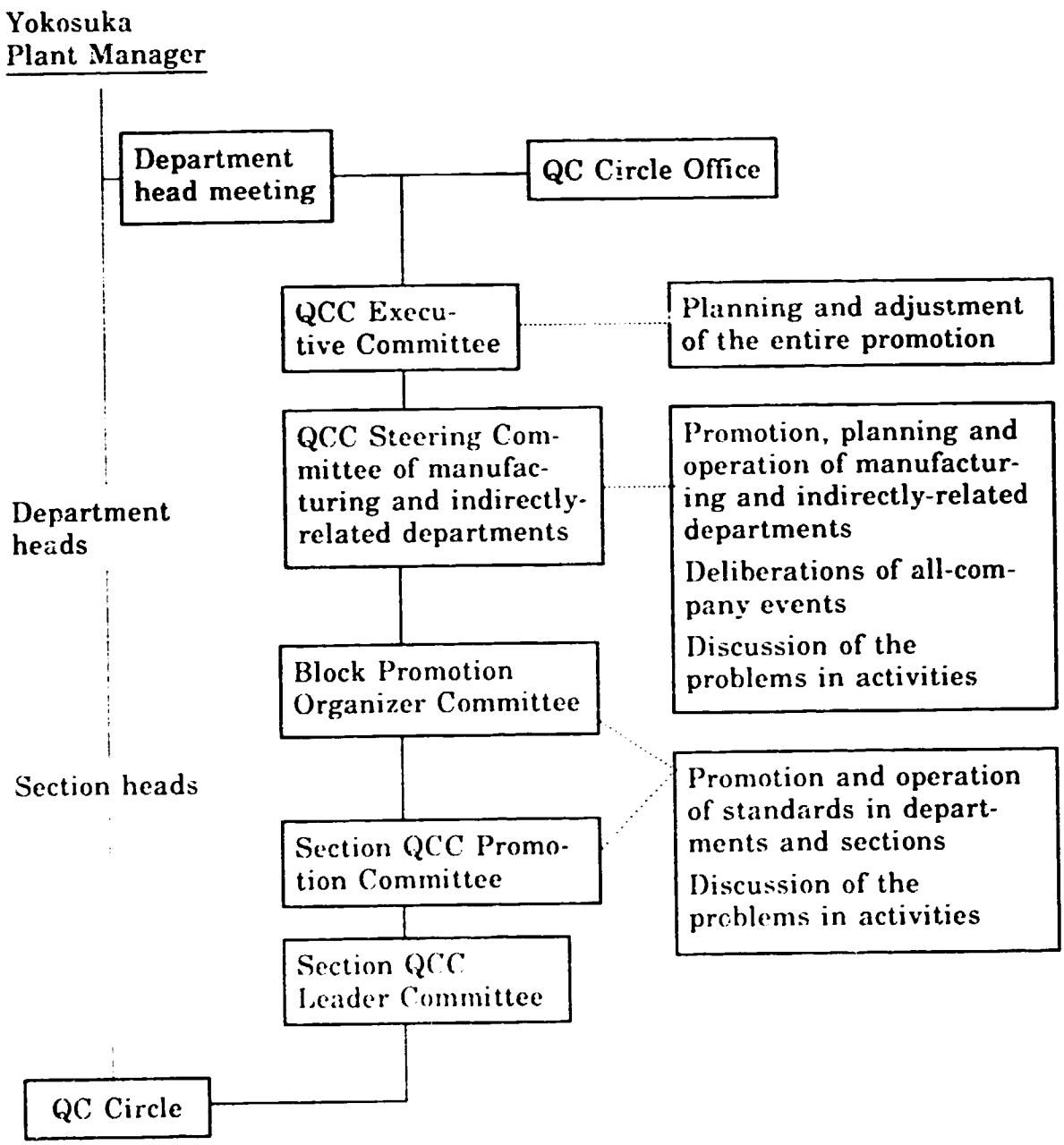
QC Circle Activity Slogan

Achieve higher quality and lower cost through activities involving everyone.

Activity system



Promotion system



5. Implementation of Quality Development by TPM

(1) Total Productive Maintenance (TPM)

Purpose:

① To use the facilities more efficiently.

② To establish a total system of preventive maintenance for the entire service life of the facilities.

③ To involve all departments, including planning and maintenance, regarding the facilities, as well as the departments actually using them.

④ To involve everyone from the management to workers on site.

⑤ To promote productive maintenance through voluntary activities by small groups.

Comparison of TPM with TQC

Items	TQC	TPM
Purpose	To improve the company structure (improve achievements and provide a more active workplace)	
Control object	Quality (result at the output side)	Facilities (cause at the input side)
Means to achieve the purpose	Systematization of control (systematization and standardization) — Software-oriented —	Develop the site and products into the form it should be. — Hardware —
Developing human resources	Concentrated on management technique (QC method)	Concentrated on specific technologies (facility technology and maintenance skills)
Small-group activities	Voluntary circle activities	Integrating small-group activities into organizational activities
Goal	Reduce to PPM (Parts per Million) level	Completely remove loss and waste (reduce to zero).

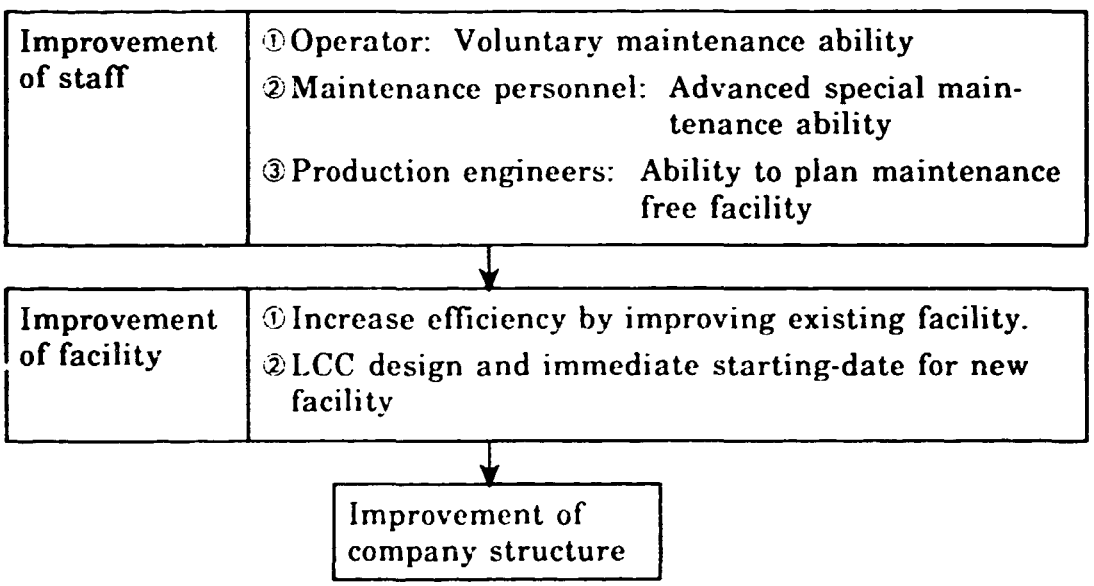
(2) Implementation of the TPM Activities

(2.1) Background to the introduction of TPM

Companies have missions to be achieved, including productivity, quality, safety and delivery term. They may be considerably damaged by improper handling of facilities. By improving these areas, we can "establish a production system to manufacture in time with sales" so that we can answer the needs of customers.

(2.2) Purpose of introducing TPM

To completely remove loss and waste by improving the company structure through improved facilities and staff.

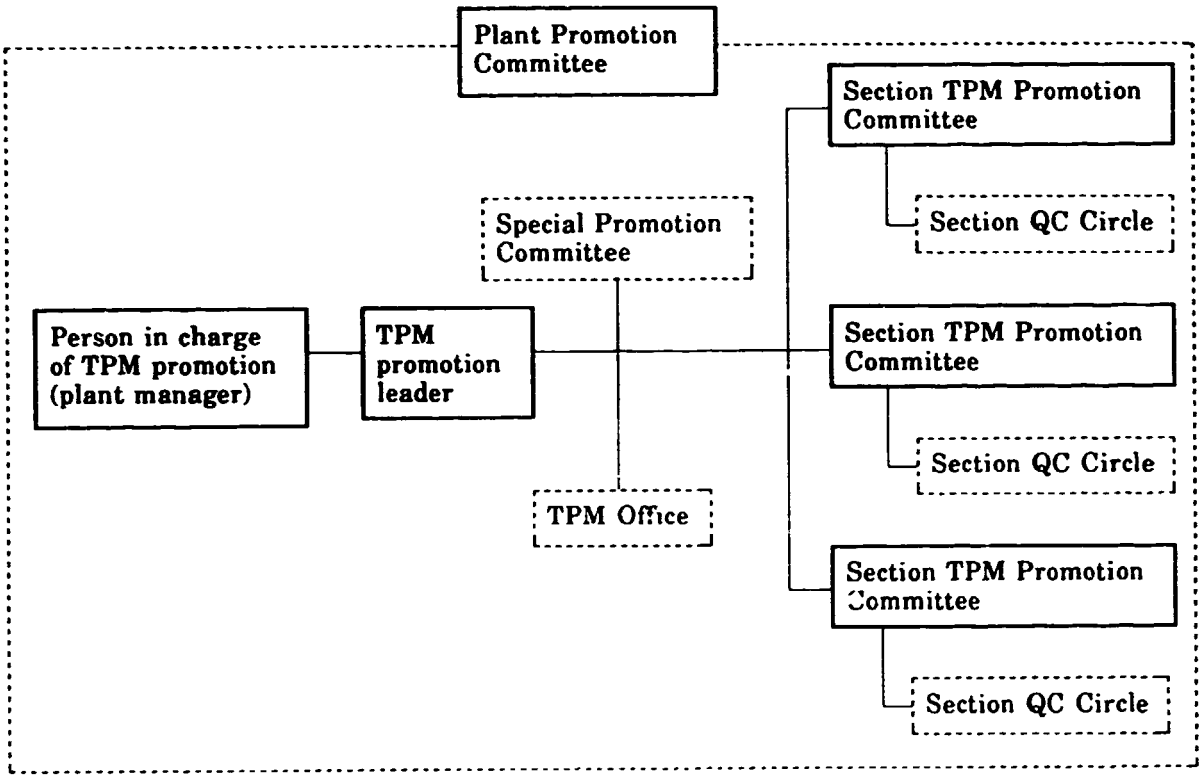


(2.3) TPM: basic policy

Increase the total efficiency of the facilities to the maximum extent by improving both staff and facilities. Establish one of the best production systems in the world to supply the markets with high quality products without any defects.

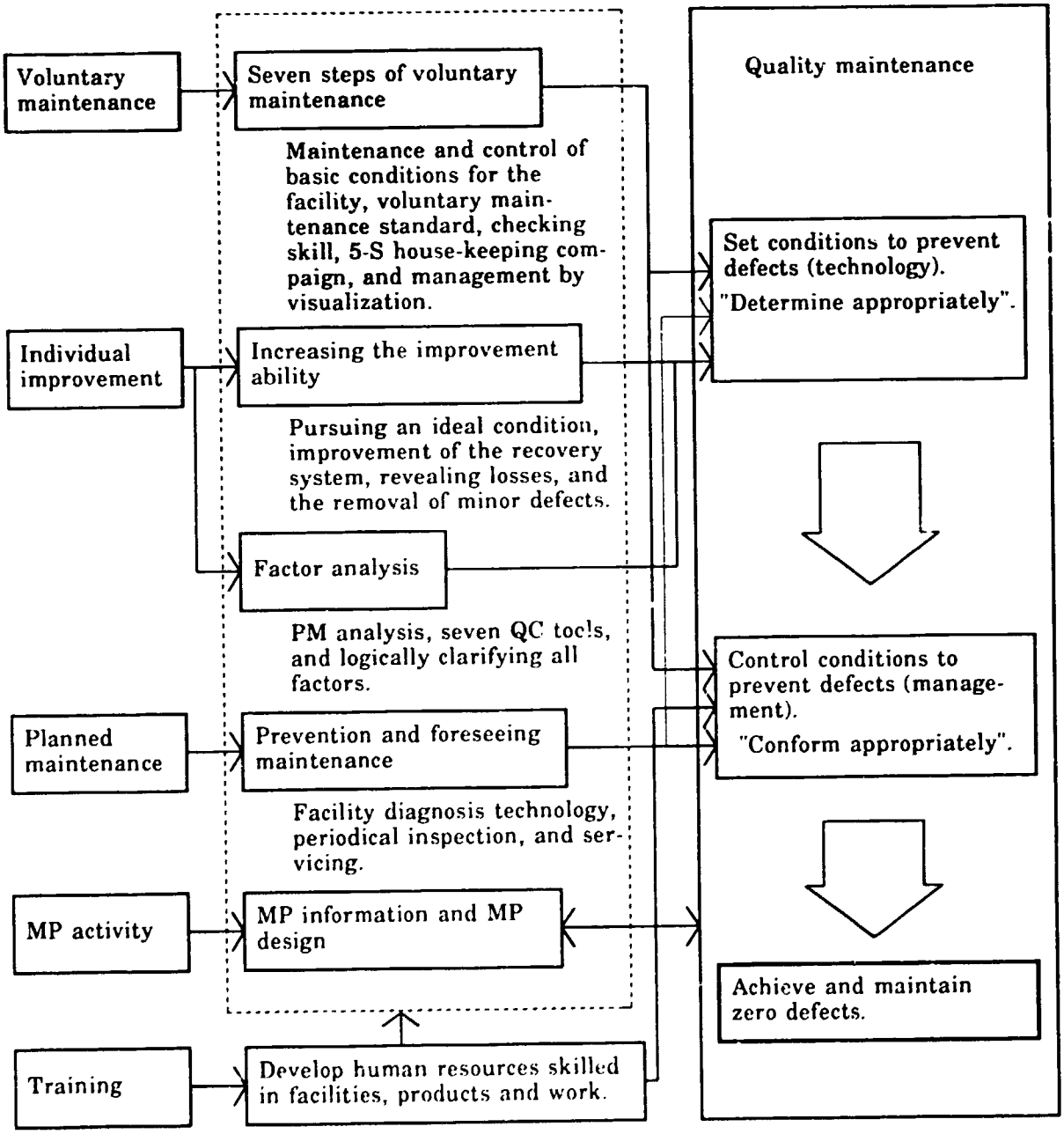
(2.4) Basic operation of TPM

1) Promotion organization



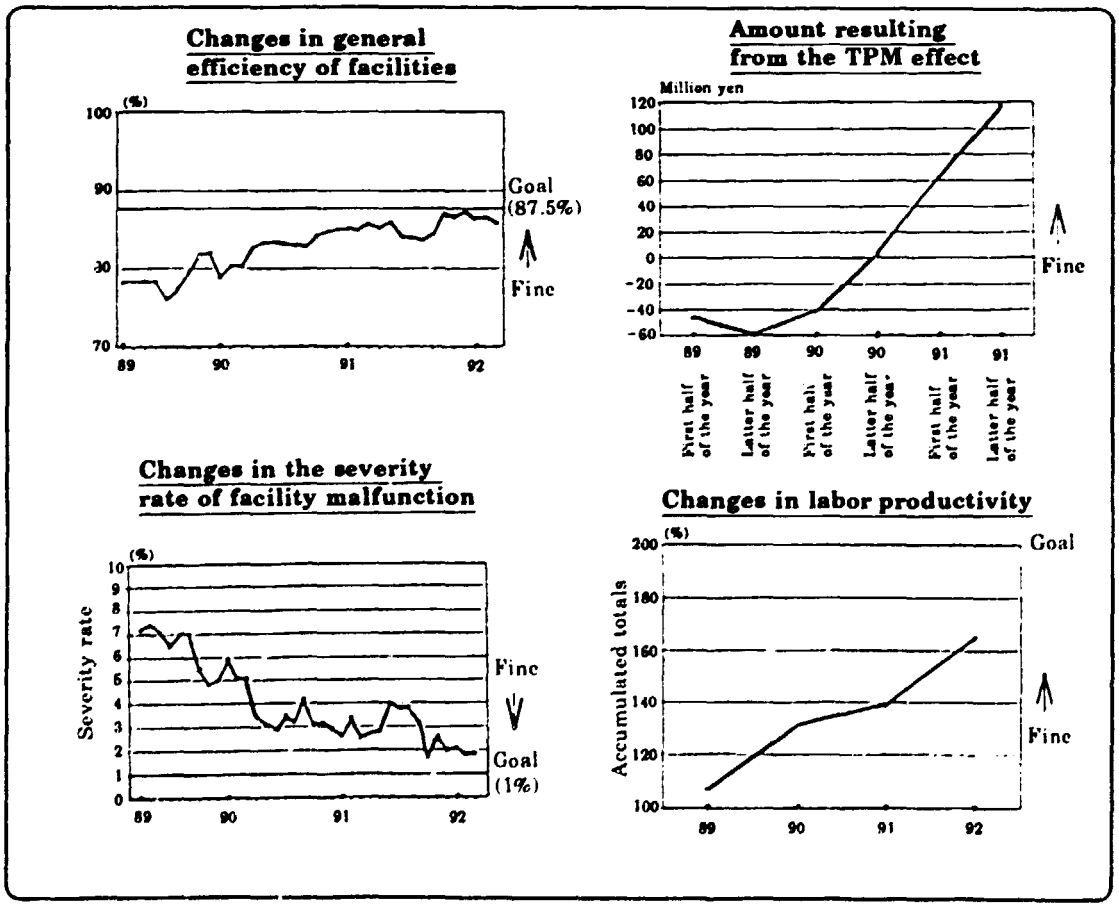
(3) Steps of the TPM Activity

< Steps of the five major processes in the TPM Activity are related to quality maintenance as follows: >



(4) Results of the TPM Activity

	1988	1989	1990	1991	1992
Master plan	May ●Announced introduction of TPM.	April ●Started TPM activity. ← 1st step 2nd step	3rd step 4th step	5th step 6th step	August ●Examination October ●Received the prize. → 7th step
Consultation	October ● → Start				February ● Special guidance
Diagnosis	September ●Preliminary inspection			January ● Preliminary diagnosis November ● Preliminary diagnosis	
Lecture meeting	August ●One-day lecture		June ●TPM Conference	June ●TPM Conference	



(5) Key Points for Successful TPM

① Willingness of the management

* The management should lead the TPM activity.

② Set a goal (ideal condition = future vision) and work towards achieving it.

* Thoroughly discuss a future vision three years ahead and set the goal.

③ Conduct many individual improvement measures.

* Produce effects by individual improvements. No result will be obtained without improving the facilities.

④ Ensure the implementation of voluntary maintenance.

* Utilize the step structure of the activity so that people can experience the pleasure of passing a step examination.

* When using the step structure, the management should clearly indicate the expected standards in order to stimulate people.

* Praise, rather than scold. Create an environment which is challenging, but which lacks any fear of failure.

⑤ Each organizational structure leader should approach the activity seriously.

* Achieving successful results depends on the enthusiasm, action and leadership of the leaders.

⑥ Everyone should participate in the activity and cooperate mutually.

* Everyone should promote TPM. Efforts by each person will produce results.

⑦ Implement the activity thoroughly and continue it.

* The TPM Activity should be implemented seriously and thoroughly. Stimulate people by clearly showing the points of the activity.

* To allow the competition principle to function, make the results of the activity visible to everyone.

(MEMO)

(MEMO)

2nd day
Jan. 26 – 28, 1993

SESSION II: QUALITY SYSTEM IN SMALL AND MEDIUM SIZED COMPANY

Quality Control in Small and Medium-sized Industries

Speaker: Mr. Leo Susilo
Vice President,
PT. Astra International

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2nd day
Jan. 26 – 28, 1993

SESSION III: ISO 9000 SERIES

Significance of Firm Registration in Accordance with ISO 9002

by Susumu TSUNASAWA
Section Manager
Quality Control Section
Suzuka Fuji Xerox Co., Ltd.

1. Introduction

Triggered by the unification of the European Community, the Activity of Acquiring Firm Registration in accordance with ISO 9000 is highlighted, as well as product liability (PL) and customer satisfaction (CS), both in Japan and in foreign countries. The acquisition of Firm Registration is inevitable in the process of economic internationalization. However, the facts that these standards themselves are seen as a "quality system" and that they originated in England have generated a gap with the Japanese perception of quality control, making it difficult to interpret these standards. Many companies are facing difficulties in understanding and implementing these standards.

Among Japanese companies, Suzuka Fuji Xerox has succeeded in acquiring ISO 9002 Firm Registration at a relatively early date (March, 1991). We have already experienced four periodical external audit after Firm Registration. We would like to explain the significance of Firm Registration and how to utilize it by looking back at our acquisition activity.

2. Company Outline

Suzuka Fuji Xerox was established in 1982 as a production strategy base of the Xerox Group. The company is fully owned by Fuji Xerox. Suzuka Fuji Xerox supplies machines and electric/electronic parts and units manufactured at state-of-the-art facilities using total technology of Xerox to manufacturers of office-automation and information equipment both in Japan and overseas, as well as to the Xerox Groups all over the world.

- Capital: 4 billion yen
- Turnover: 50 billion yen
- Employees: 1,100
- Business: Manufacture and sales of OA equipment and related products and parts [Electronic parts, metal molds, metal processed products, rubber molding and plastic molding]

3. Management Policy

"Suzuka Fuji Xerox is founded on the principle of providing eminent value through continuous efforts and innovation both inside and outside the company. We contribute to and promote understanding and harmony in society."

4. Long-term Vision

Suzuka Fuji Xerox recently celebrated its tenth anniversary and reviewed its business from the beginning to the present. We will grow to become a "good manufacturer capable of operating worldwide" through effective business development by utilizing our characteristics. We will contribute to the creation of a rich future that is friendly to both humankind and the earth by taking care of the precious global environment.

<Keywords>

- Strong company
- Gentle company
- Interesting company

5. Details of Firm Registration Activity

5.1 Motivation

5.1.1 External Requirements

- On April, 1990, we received an order from Fuji Xerox for products to be exported to England. The order required that we obtain product certification (the BS Kite Mark) for electrical safety.

- The BS product certification requires that products satisfy the safety standard. It also requires manufacturers to establish a "quality control system" to assure the consistent production of such products. Periodical external audit must be conducted.

  1) Preparation of Quality Manual

  2) Establishment of quality control plans for individual products

5.1.2 Internal Requirements

- Since Suzuka Fuji Xerox started its operations in 1982, it has increased its business areas, production volume and number of customers. As a result, we came across the following problems during the standardization process within the company.

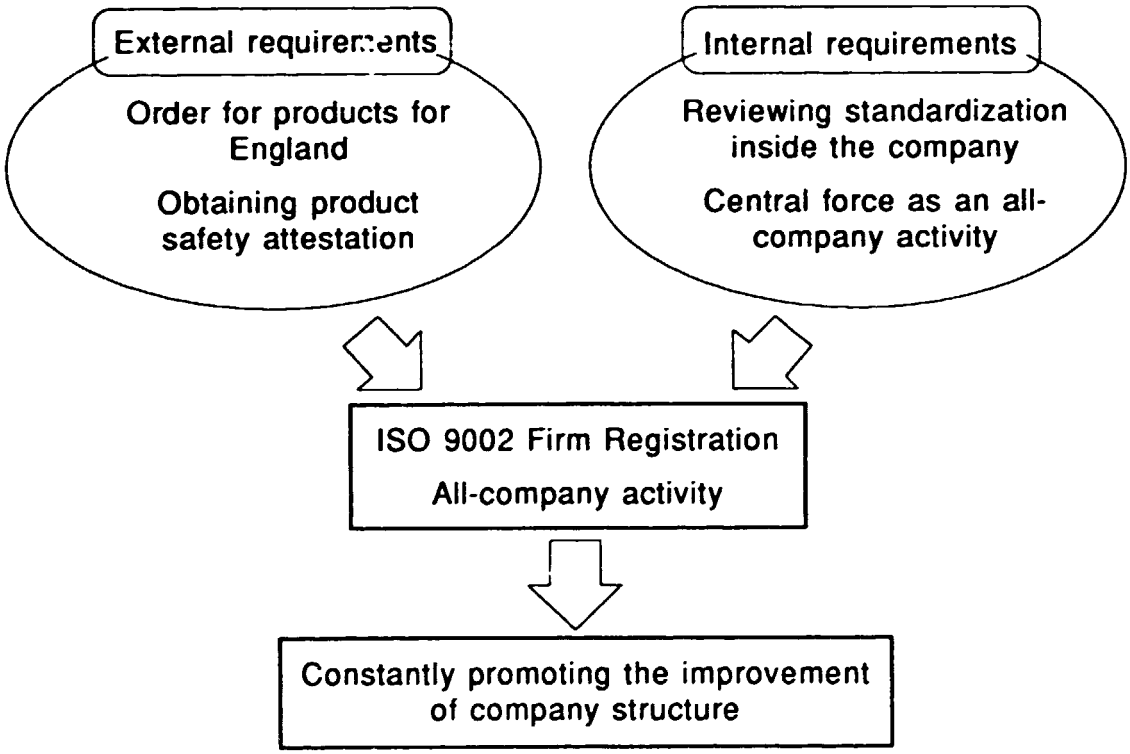
1) Because the forms of object products vary to a large extent, we have implemented specific quality control systems for different manufacturing divisions.

2) No review has been made of provisions and rules.

3) Unified standards in the company must be rebuilt.

- Our tenth anniversary is a good change to unify all-company activities and make them a central force for all employees.

5.2 Approaching ISO 9002



Although efforts for the acquisition of Firm Registration represented a large part of our preparation work, we needed to organize unified all-company activity because of the extensive range of divisions. Therefore, we set up a project called "Activity for Acquiring Firm Registration."

5.3 Activity Target

- To acquire Firm Registration for BS5750 PART-2 (ISO 9002).
- Certification body: BSI (UK).
- Deadline: End of 1990

5.4 Project Outline

- Project representative: Managing Director
- Promotion leader: Section Manager of the Quality Control Section
- Members: Selected from all divisions (total of 20 persons)
- Meetings: Weekly (2 to 3 hours each)

5.5 Activity Steps and Details

1) From April, 1990: Started investigation of the BS safety standards required for the ordered products to be exported to England.

2) July, 1990: Established the project team.

3) From July, 1990: Studying and understanding the details of the ISO 9002 standards.

4) September, 1990: Prepared the Quality Manual.

   - Made an application to the British Standards Institution (BSI).

5) November, 1990: Developed subordinate provisions of the Quality Manual.

   - New provisions (approx. 30)
   - Reviewed existing provisions (approx. 40)

6) November, 1990: Conducted site diagnosis by the project members (three times).

7) December, 1990: Conducted site diagnosis by the management (two times).

8) January, 1991: Conducted prior investigation by the JMI Institute (investigation prior to assessment by the BSI)

9) February, 1991: Examination by the BSI

   - The examination was conducted for three days by three examiners.

10) March, 1991: Official registration was issued by the BSI.

6. Situation After Firm Registration

Since Suzuka Fuji Xerox acquired Firm Registration in March, 1991, it has already experienced four periodical external audit (May, 1991, November, 1991, June, 1992 and

December, 1992). Compared to our first experience with the assessment, we are now used to it and thus psychologically able to respond with composure. However, all of us always approach each audit with a sincere attitude because this is a external audit by the BSI (JMI).

We restarted the project activity by establishing a "Quality System Control Committee," consisting of representatives from divisions, to maintain and improve the quality system. The committee is now in operation as follows:

1) Providing information and training related to ISO 9000.

   - Participating in seminars outside the company.
   - Implementing study meetings.

2) Extracting and improving unsatisfactory items in the quality system (reviewing the provisions).

3) Implementing periodic internal audits by the committee members (twice a year).

7. Effects

Although no direct economic effect has been recognized so far after the acquisition of Firm Registration, the following effects have been noted:

1) Purchasers conduct a survey on products before they enter a purchasing contract. In such cases, the checking process of quality control can be simplified by submitting our Quality Manual. Also, evaluation using our Quality Manual results in high ranking. In particular, the effect of Firm Registration is most noticeable in trade with overseas companies well known for relying on ISO 9000.

2) Developing provisions and rules resulted in clarified responsibility and decision standards so that proper actions can be taken when problems occur in the company. Consequently, the processing speed of finding the cause of problems is increased.

3) Reviewing provisions for changes in organizational structure can be timely performed.

4) Periodical audits (twice a year) by external agencies act as a good stimulus to ensure that internal audits are properly implemented. (Daily activities of the Quality Control Division are facilitated.)

5) Management diagnosis can be implemented both on site and on the products. Thus, the time required for the preparation of information needed for diagnosis can be reduced. (The actual effect can be improved.)

6) The interior of the plant is cleaned each time an inspection is conducted.

8. Looking Back at the Activity

For Suzuka Fuji Xerox, this Firm Registration Activity has a meaning of "activity of reviewing the quality control system" involving the entire company. It is a timely activity by attemping to satisfy both external and internal requirements. As a result, we could obtain the effects mentioned previously.

During the period from preparation for Firm Registration to the first examination, we studied diligently to prepare for the examination. We feel that we can understand the true significance of the requirements of ISO 9000 now that we have obtained Firm Registration. We would like to consider this matter by comparing ISO 9000 to TQC.

The important points of ISO 9000 are as follows:

1) Documentation of what must be done (requirements of ISO standards).

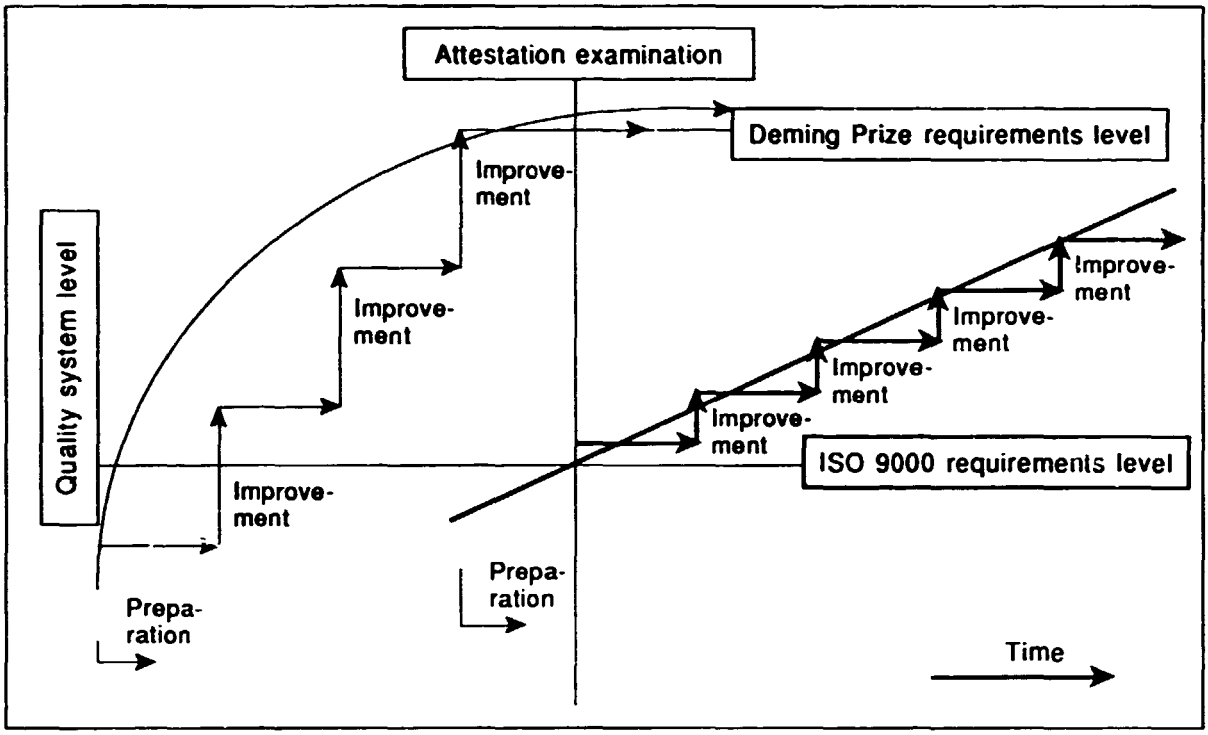
2) Compliance with documented requirements.

3) Quick improvement if problems have been found.

4) Recording the results of implementation.

This can be a minimum system by adding ISO requirements to an existing system according to the current situation, rather than creating an extremely advanced control system. We feel that a quality control system of a company in which TQC has been introduced and implemented would adequately satisfy the ISO requirements. The important thing is to ensure the implementation of documented requirements and to periodically review the quality control system. In other words, steady improvement begins after Firm Registration.

We can say that Firm Registration is something like acquiring a driving license. The examination focuses on basic operations in accordance with the rules and ability of safe driving, rather than testing advanced driving technique. After acquiring a license, the driver should work at improving his or her driving skill, which is then checked by external audit. In terms of preventing inexperienced drivers from handling a car, this is a reasonable attestation system.



While the Deming Prize requires a considerable period of time for activity and improvement achievements, the preparation for ISO 9000 can be done in a relatively shorter time as it does not require past improvement and quality achievements. However, ISO 9000 requires periodical audit by external agencies twice a year after the acquisition of Firm Registration. In the periodical inspections, the quality system is required to be improved (reviewed). Thus, activities after the acquisition of Firm Registration play an important role.

9. Points in Utilizing the ISO 9000 Firm Registration System

The way of approaching and utilizing ISO 9000 Firm Registration depends on the actual situation and level of the company attempting to acquire this registration.

The way of thinking behind ISO 9000 is not different from the concept of TQC. They have the same concept of turning the control cycle of PDCA, basic of quality control activity. Therefore, for a company with an advanced quality control system and with an adequate TQC system, the acquisition of Firm Registration would be relatively easily attained. Effective measures would include a review of conventional systems and a strengthening of quality control by ensuring internal audits, documentation and the development of the well-organized recording system required by ISO 9000.

The more advanced a system is, the more difficult the maintenance of such a system will be. In not a few cases, the functions of a quality system do not effectively work without implementing a review of out-of-date standards and procedures, while the environment surrounding a company and its organization and production process have been changed. To prevent such a situation, the quality control system should always be up-to-date with effective functions by conducting internal audits and periodical audits by external agencies, based on ISO 9000. This can enhance the quality control of companies.

In addition, acquiring ISO 9000 Firm Registration will facilitate trade with overseas companies.

However, for companies still in the process of introducing TQC, intensive activity will be required for acquiring Firm Registration. Such activity will be an effective driving force in terms of proceeding with the development of a quality control system within a short time. As mentioned before, the concrete target of acquiring Firm Registration may be attained within a relatively short period of time of preparation. It is easier to approach as a unified all-company activity.

However, there is a question as to whether satisfying ISO 9000 standards assures product quality. This is because the requirements of the standards are limited to quality systems. Requirements regarding the level of product quality and its improvement are weak. Even if periodical audits by external agencies are conducted twice a year, they are not enough to check the level and details of quality.

In our case, we inherited TQC from Fuji Xerox and developed it inside the company. (Fuji Xerox was awarded the Deming Prize in 1980.) However, the development of an internal organization system could not catch up with the rapid growth in our company. This resulted in unsatisfactory standardization. Also, in the production site, the hiring of part-time workers increased, as did subcontracting work to subcontractors and the number of foreign workers. Thus, we were facing a turning point in changing our conventional control method to a European-style control system. Therefore, the Firm Registration activity served as a great stimulus to the company. Because of this, we could succeed in developing standards, reviewing out-of-date provisions, and fully training the employees within a short period.

Quality control system level	Introduction of TQC	Points in utilizing ISO 9000
Fine	Introduced (with achievements)	• Strengthening the quality control system • Firm Registration facilitates trade with overseas companies.
Normal	In the process of introduction	• Reviewing the quality control system • Reviewing standardization • Strengthening the company structure (unified all-company activity)
Poor	Not yet introduced	• Building a quality control system • Promoting standardization within a short period

10. Conclusion

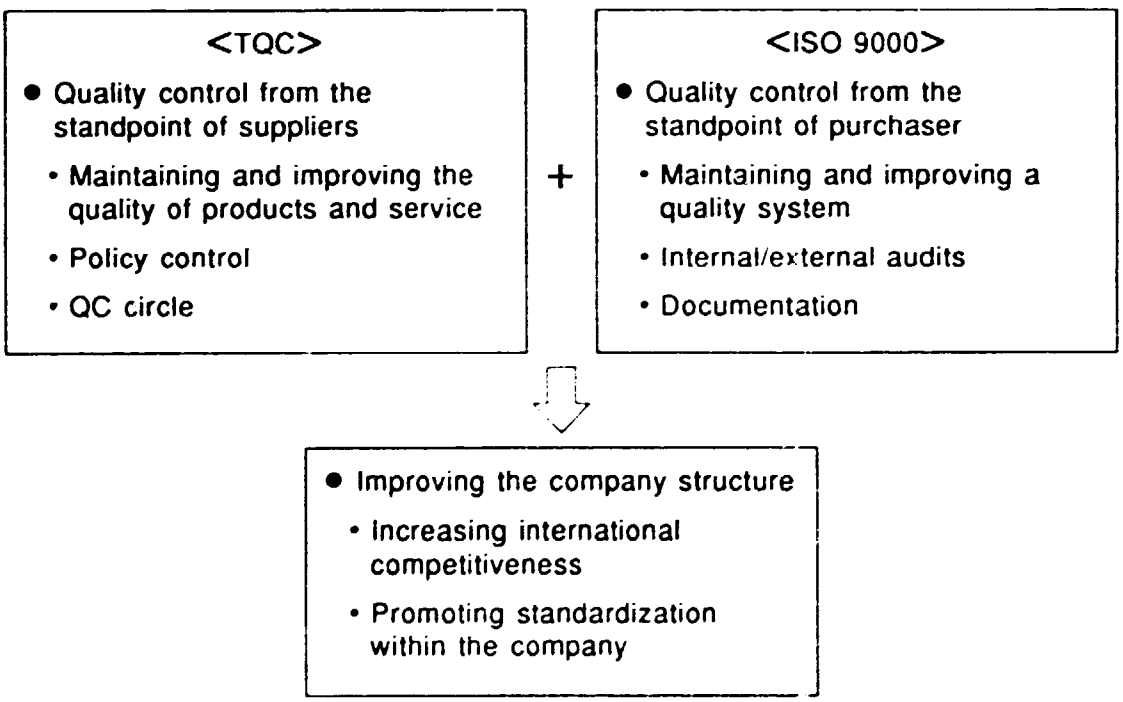
Generally, Japanese quality control (TQC) has a principle of pursuing the rationalization of companies based on policy control, and is founded on "improvement" supported by the lifelong employment system and independent activities. It has a high reputation in international organizations. However, the recent trend requires the attestation of ISO as an essential condition for trading in European markets.

ISO 9000 has a principle of protection of purchasers. Thus, it requires extremely systematic ruling, recording, inspection and auditing. Although it has strict requirements for quality systems, there are few requirements for assurance standards for the product or service quality itself. As a result, the attestation of ISO 9000 does not directly imply a proof of satisfying the quality of product or service.

Therefore, it is important to merge the advantage of ISO 9000 with that of TQC. If the quality control system of ISO 9000 can be integrated on the base of TQC, the strengthening of quality control can be enhanced. Of course, it would be no problem to introduce the way of thinking of TQC after establishing an ISO 9000 system.

At any rate, when approaching ISO 9000, the current quality control level must be correctly recognized, the points in utilization mentioned before must be understood, and a target set up in accordance with the ability of the company.

Integrating ISO 9000 into TQC



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2nd day
Jan. 26 - 28, 1993

SESSION III: ISO 9000 SERIES

What is Needed for Enterprises Seeking Registration to ISO 9000 Series Standards?

by **Chikafumi MORITA**
Director,
Quality Assurance Center
JMI Institute

The trend of obtaining certification of registration based on the ISO 9000 series standards by the third party is rapidly increasing both inside and outside Japan.

What drives companies to obtain the certification of registration to the ISO 9000? As you may know, the ISO itself does not have the power to impose its standards. Therefore, pressure to acquire the registration comes from the customers of the respective companies. One of the driving forces for companies to acquire the registration to the ISO 9000 was the unification of the EC markets that occurred at the end of 1992. EC member countries declared that they would employ the ISO 9000 series standards as the unified standard for quality assurance systems in the EC after unification. Increasingly, a quality assurance management system based on the ISO 9000 series standards is required of suppliers by their customers, both purchases by private companies, as well as purchases by government agencies. I think that this fact is kindling the fear that companies will not be able to enter the EC market without obtaining the registration to the ISO 9000 and this fear is driving them to acquire the registration.

However, research on companies in Japan that have already obtained the registration to ISO 9000 revealed that such an inference is not always true. The major opinion of the companies is that the acquisition of the ISO 9000 registration is a good chance to review the existing quality management system in the company. The research also says that the pressure of the registration acquisition because of the unification of the EC is just part of the purpose of acquisition, and the main purpose is to strengthen the quality assurance management system.

In addition, many companies mention that the ISO 9000 series standards facilitated a highlighting of points in their procedures in the Total Quality Management (TQM) activity with which they did not know how to proceed; the parts that they had difficulty with became clear.

What is the difference between the ISO 9000 series standards and the traditional quality management activity in Japanese companies? The ISO 9000 series standards are based on a formal quality management system, establishing an appropriate quality manual and recording by documentation (including electronic media). This system is available to, and must be used by, all people in the company. In traditional quality management activity in Japanese companies, some of these processes were managed by a few specialists, and many parts were deemed to be individual property, rather than company property. Documenting these parts formally and establishing a quality manual mean eventually establishing comprehensive information so that even a new person knows the content of the work, the necessary technical qualifications, responsibility, authority and countermeasures for problems. As a result, products of consistent and uniform quality can be produced by everyone in the company. This is the concept of quality assurance in the ISO 9000 series standards.

Most companies that already obtained the ISO 9000 registration say that the main purpose of introducing the ISO 9000 series standards is to strengthen the quality assurance management system in the company, and utilizing the fact of acquisition in sales activities is incidental to this.

Some companies work on the establishment of a quality management system, and challenge the acquisition of the registration by a third party so that they can upgrade their company image. In the circumstances of globalization, in order to establish quality assurance systems that are specific to the company and to make these systems easy to understand for customers, there is the trend to make them to conform with the International Standard, ISO 9000 series standards. Most of the companies enjoying successful business in international markets already have their existing quality assurance systems. Nevertheless, some companies have taken an active attitude by regarding the acquisition of the ISO 9000 registration as a trigger to revise their own quality assurance system.

When a company introduces the quality system based on the ISO 9000 series standards, the first thing we recommend is to make a "matrix" which shows relations between the items for quality activities and all departments in the company. An example is shown in this matrix. The matrix does not have to be made in such detail as the one in the example. It can be a simple matrix showing relations between the quality elements of the ISO 9000 series standards and all departments of the company. Using this matrix, the departments that are involved in particular quality activities can be clearly identified.

There are three important points in establishing the quality system based on the ISO 9000 series standards. First, requirements should be defined. Second, responsibility and authority should be defined. Third, the method of achieving the quality requirements should be defined. All the people involved in the quality activities in the company examine whether their work related to quality is defined in a documented form with reference to the above three points. If something is missing, it must be documented and appropriate procedures must be also established.

Breakdown of Activities

1 Sales
2 Purchasing
3 Development department
4 Warehouse and dispatch
5 Work preparation
6 Production department no.1
7 Production department no.2
8 Quality department

	0									1									2
ACTIVITIES	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Tendering	X		X			A														
Order handling	A					X														
Purchasing raw materials		A	X																	
Subcontracting		X			A															
Receiving insp. raw materials				X				A												
Storage raw materials				A																
Production of orders/document					A															
Planning					X															
Production of components						A														
Pre-assembly						X														
Finishing						A														
Spraying colour paint							A													
Final assembly							X													
Final inspection								A												
Packaging				X			A													
Warehouse storage				A																
Dispatch				X																
Development of new product			A		X	X	A	X												
Training					X															
Document control					A			X												
Measuring equipment								A												
Quality manual								A												
Computer control			X		A	X														

Quality Assurance Management

The principle of quality assurance management is to manufacture products correctly from the first stage. The purpose of the ISO 9000 series standards is to facilitate companies to achieve this principle and to minimize error in terms of the quality of the products provided to customers. As a result, the satisfaction level of customers will increase, and many companies can reduce their operational costs and improve the working environment of the company. The ISO 9000 series standards define quality as "that which satisfies the needs of customers". This means that products to be provided to customers should ensure quality in accordance with this purpose. Although this is just a commercial definition, customers expect such quality. Therefore, the ISO 9000 series standards do not designate any specific quality level. However, if there are specifications as to an official product standard, or legal rules, these are quality levels that must be used by companies.

The most common inquiries that people make are how far, to what extent, or to what level must companies satisfy requirements of the ISO 9000 series standards? All these questions are not answered in the requirements. Companies must judge and determine a reasonable level in accordance with their quality policy, objectives and customer requirements. And they must implement their decided level and record the results accordingly. We, certification bodies assess whether the company is implementing its determined and documented procedures as it is.

The important thing we must understand is that the ISO 9000 series standards are for the quality assurance management system. In other words, the standards suggest how companies can provide products with consistent quality to their customers. Currently, the ISO 9000 series standards are used in various service areas, as well as in the manufacturing areas, and we conduct assessments for them. For example, the ISO 9000 series standards are used in schools, hotels and restaurants. Thus, the ISO 9000 series standards are used in all types of industry.

ISO 9000 Series

(ISO 9000)

The name of "ISO 9000 series" is derived from the names of the corresponding standards. ISO 9000 is an advice standard with two purposes; one is to clarify the differences in the main concepts concerning quality and their mutual relations, and another is to provide guidelines for selection and use of a series of international standards concerning the quality system, which are applicable to the purpose of inside quality control (ISO 9000-4) and the purpose of outside quality assurance (ISO 9001, ISO 9002, ISO 9003).

The fact that the composition of this series is not ideal can be found in this stage. Since the 9000 series is in the fixed form, we are likely to read from page 1 of 9000 to 9002 to 9003 and to the last page of 9004, but this is not a good way of reading this series. If possible, read ISO 9004 right after finishing ISO 9000.

(ISO 9004)

ISO 9004 is a secondary advice document in the ISO 9000 series, giving detailed advice to a company about the general quality management and the requirements of the quality system. ISO 9004 gives, in addition to the requirements of the three standards (ISO 9001, 9002 and 9003) which are used for contract documents, guidance in other fields such as marketing, safety of products, responsibilities for compensation of products and quality costs, and, therefore, ISO 9004 is the most useful standard in the ISO 9000 series.

The companies which implement their own effective quality management instead of applying the system requirements of ISO 9000, 9002 or 9003, attain successful goals by using ISO 9004. Since ISO 9004 is an advice document, it is written using "should," instead of a mandatory word "shall." The remaining three standards, ISO 9001, 9002 and 9003 are used for contracts between suppliers and customers. For this reasons the mandatory word "shall" is used in these documents. Even ISO 9003, the simplest standard for a quality system is written using "shall" to reflect the obligations of suppliers.

Since the three mandatory standards are applied to the average processes, examinations from the simplest one to the most complicated (in other words, in the order starting from ISO 9003 to ISO 9002 to ISO 9001) is considered the best to study their applicable scopes and functions.

(ISO 9003)

ISO 9003 is a contract standard used when compliance with the specified requirements is assured by suppliers only by the final inspection and test.

This standard does not end here. Quality plan for the management policy and organization is apparently required. Documentation of the procedures to follow is necessary, and the documents should be controlled. Personnel should be educated and trained. Inspection and test equipment should be calibrated and controlled.

The system to indicate the state of inspections and tests should be established to control products of nonconformity. Records of quality should be kept, and if appropriate, statistical methods should be established. The above looks complicated, but the requirements of ISO 9003 are a simplified version of the same requirements specified in ISO 9001 or ISO 9002. The quality system of ISO 9003 is generally applicable only to comparatively simple products or services.

(ISO 9002)

The step-up from the requirements of ISO 9003 to those of ISO 9002 constitutes a very big difference, compared with the step-up from ISO 9002 to ISO 9001. The standard of ISO 9002 prescribes the method of assuring the conformity with the specified requirements by suppliers during manufacture and installation.

It includes the requirements of the final inspection and test specified in ISO 9003, but specifies them more in detail. In addition to that, ISO 9002 prescribes the following requirements.

1. Internal audit
2. Contracts Review
3. Purchasing
4. Process control
5. Corrective action
6. Purchaser supplied products

(ISO 9001)

ISO 9001 is the most complete model of the quality assurance system. The sentences of each item in ISO 9001 are entirely the same as those in ISO 9002, but two more elements of the quality system are added to its mandatory requirements. These two elements are design control and servicing and they are reflected in the title of the standard "Quality Systems - Model For Quality Assurance In Design, Development, Production, Installation and Servicing."

The above is the composition of the ISO 9000 series of standards. The point to which I wish to call your attention is that the purpose of the ISO 9000 series is not to standardize the quality system implemented by various companies. The fact that there are three mandatory standards does not mean that there are three kinds of excellent levels, but it means that the elements of the quality system are divided into three separate models based on the functions required of suppliers of products or services, or the capacity of the organization of companies.

It is known that from among the three mandatory standards one can be selected which satisfies the needs in almost all circumstances. It is also acceptable to eliminate some elements of the quality system required by the selected standard in some cases or add other elements in other case. For example, there are no reasons why you cannot supplement ISO 9002 by the items concerning servicing taken from ISO 9001. When elements of the quality system specified in the selected standard need amendments, it should be stipulated in the contract that an agreement is required between the purchaser and supplier.

The ISO 9001 standard consists of 20 quality elements covering item 1 to 20. The ISO 9002 consists of 18 quality elements, excluding design and servicing. (ISO 9002 will contain 19 quality elements including servicing after 1993 revision). All requirements in ISO 9001, 9002 and 9003 are mandatory and essential. However, I would like to focus on common problems only in this discussion because the standards have so many essential items.

Management Responsibility (Clause 4.1 of ISO 9001)

The third most frequent item evaluated as nonconformity in our assessment is the management responsibility. Approximately 10 percent of the total nonconformities pointed out in our assessments is related to the management responsibility. This clause requiring the management responsibility is considerably long, because this establishes the entire plan of the quality assurance system.

First of all, the provision requires the company management to define the quality policy and the responsibility and authority for personnel affecting quality, and to document them. The company management is the top management of the company. In the ISO Technical Committee TC176, WG11 held in November, 1992, there was active discussion to clarify the current definition of supplier's management. In this discussion, a variety of terms such as supplier's executive management, top management, senior management, etc., were suggested. Finally, a decision was reached to use the term "The supplier's management with executive responsibilities for quality". This was based on an interpretation that the senior management of the company should set quality policy and objectives.

The first priority in a quality system is that the management of the company must participate in the system. The executive management must make efforts so that the quality policy and objectives are efficiently and thoroughly implemented and understood in the company. For example, when our assessment checks the situation of understanding of the quality policy at every level, our auditors would ask ten people in the company, for example, to see if the quality policy established by the management is correctly understood and is actually being implemented. If we find out that it is not being correctly understood, the item regarding the management responsibility is evaluated as nonconformity.

Practically, the president, who is the chief executive officer, should guide these things. Of course, there are exceptional cases where the president does not execute this kind of responsibility and authority, and entrusts other executives to do so. However, the president has the final responsibility for the quality of the company in any case.

Clause 4.1 requires clarification of the responsibility and authority assignment for all those who are involved in the quality of products to be provided to customers, and the relationship between them. In particular, the provision requires clarification of the responsibility and authority for work related to prevent the occurrence of nonconformity products. In other words, it requires identifying all the quality problems that have occurred, recording them, suggesting solutions, then confirming that these solutions are being implemented.

Next, the provision requires the taking of appropriate measures and assigning qualified persons (who have had specific training) for the work of verification. In other words, specific personnel must be assigned for the verification of product design or for actual processing inspection. Of course, these verification items include monitoring and audits of the quality management system itself.

The requirement emphasizes that the personnel who conduct the actual verification of product design or audits of the quality system must be independent from the people directly involved in the actual work. For example, when conducting internal audits of the quality system, an auditor belonging to the Quality Assurance Department cannot executes an audit of the quality system regarding that department. In such a case, a trained auditor in a department other than the Quality Assurance Department must conduct the audit.

This clause requires assigning a person in charge of control who is called the management representative. The management representative must always be appointed by the executive management of the company. The management representative should be regarded as an important position in the company, with direct authorization by the executive management. Also, the management representative should be permitted to enter any place related to the quality system.

In addition, the provision requires the management to review periodically if the quality assurance system is proper for the company and whether it actually functions. This management review is an important quality activity to evaluate the results of the internal quality audit and is authorized to modify the quality system.

We are often asked by companies if the management representative must be someone who has some type of qualification related to quality management. My answer is that there is no particular need for this. However, if the company organization has a very complex structure, qualified personnel may be better. The reason is that the persons involved in quality management know best about the quality assurance of the products of the company, and thus they can make the quality system more effective. With smaller companies with less complex organization, persons without qualifications can be assigned to the position of management representative, if such persons know the structure of the company organization well. In such a case, we recommend them to undergo training that is at least related to basic quality management, including audit methods.

Quality System (Clause 4.2 of ISO 9001)

Next, I will discuss the quality system specified in Clause 4.2. The provision requires a documented quality system, which includes the preparation and the effective implementation of the documented quality system procedures and instructions.

In meeting this requirement, the preparation of a quality manual and quality plans, the identification and acquisition of any controls, processes, measures and techniques to achieve the required quality should be considered. Companies must clarify the standard of acceptability for them. Also, the related documents used among respective processes and departments should be compatible and harmonized. Developing such documents facilitates understanding by related people.

Furthermore, the established and documented quality system allows people to maintain consistent quality management at a constant level.

A quality system must be planned and established by taking all other functions into account, for example, communications with customers, manufacturing, purchasing, subcontract agreements and training. The quality plan, which is usually called the process quality control table in Japanese companies, should clarify the necessity of introducing state-of-the-art quality inspection and testing techniques. The quality plan must ensure implementation of the quality system, and the quality record must be properly filed.

However, a quality manual and a quality plan are not compulsory requirements in the current 1987-version standards. A quality manual must be prepared when the company applies for registration by the third party certification body. Currently, it is not a compulsory requirement in establishing a quality system based on the ISO 9000 series standards. However, this is due to be changed into a compulsory requirement in the 1993 revision. Therefore, I will now discuss what a quality manual is :

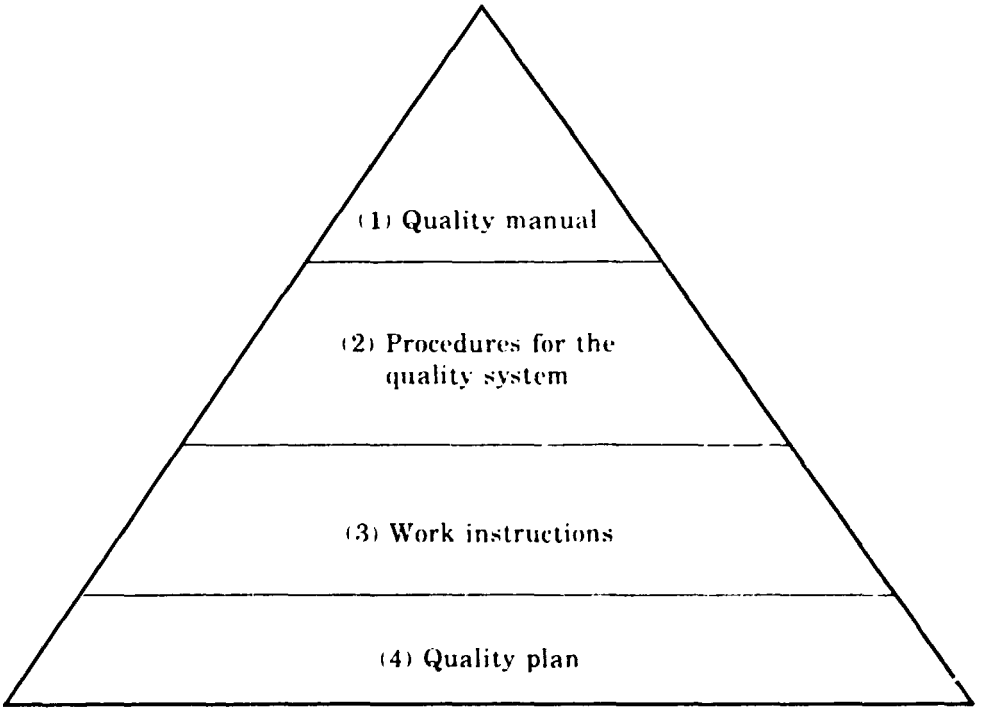


Fig. 1 Structure of Quality Management

As shown in the above figure, the "Quality manual" is positioned in the top level, but this is not grading. The "Procedures for the quality system" positioned in the second level is the company standard which is the procedure of the quality

assurance system in the company. These are followed by the "Work instructions" in the third level and the "Quality plan" (such as a process quality control table) in the fourth level. Therefore, a quality manual describes how the quality assurance system of an entire company is implemented in the order of items in the ISO 9000 series standards. In the quality manual, the company standard, word instructions and quality plans are referred to. To be brief, a quality manual outlines how the company approaches all the items of the quality elements of an appropriate ISO 9000 standard. Because the ISO 9001, 9002 and 9003 standards are compulsory requirements, the quality manual must explain the measures of the company for all items expressed with "shall" in these requirements. For example, in the item specifying the management responsibility mentioned before, the president must establish the quality policy and such a policy "shall" be understood at every level. The quality manual must state that the president establishes the quality policy and describes the specific contents of the policy, then explains what measures are to be taken for complete understanding at every level.

The process of making a quality manual does not mean obtaining a document that teaches how to write a quality manual, and then making the company standard, work instructions or process control table. A proper process would be to document current work in the respective workplaces, and to examine whether all the requirements of the ISO 9000 series standards are covered. If all the requirements are covered, it is not necessary to build a new quality system from scratch.

The quality manual can be made in two styles. The first style follows the order of the items mentioned in the ISO 9000 series standards, e.g., state the management responsibility, then describe the quality system in accordance with the sequence of the requirements. The second style is for the case where a quality system is already established in the company, and there is a manual that describes the system. Then, an index list is prepared so that "the management responsibility" mentioned in clause 4.1 can be referred to in the quality manual.

However, both the applicant company and the certification body must make the time required for assessment as short as possible. To accomplish this, the company's quality system must be as clear and understandable as possible through the quality manual. An unclear quality manual will delay on-site audit by requiring frequent clarification.

Therefore, the time required for examination greatly depends on the appropriateness of the quality manual.

Contract Review (Clause 4.3 of ISO 9001)

Next, I will discuss the contract review.

First of all, I have to make it clear that the contract review covers not just legal type "contract" but also covers customer orders. The purpose of clause 4.3 of the ISO 9001 is to confirm if the company completely knows what is demanded

by customers, and when and by what means they receive it. Obviously, this is based on the basic concept of assuring the quality of products and service to be provided to customers by quality system of the company.

Another basic concept is to confirm if the company has all the measures to satisfy the contract requirements. In other words, the requirements of customers must be basically satisfied in many aspects. In technically complex products, (for example, products for the aerospace market, or service in construction design) contracts with customers are implemented for detailed points such as drawings, material specifications, testing and inspection. The provision states that correct checking by appropriate people of these detailed items is important. When changes need to be made after a certain time, and when such changes have been made, such contents must be clearly reported to customers.

Another example tells us that with simple products for general consumers, this contract with the customer can be simply fulfilled by agreement with the party making the order. In other contracts, the standard or basic price list passed to the market or customers can be applied to this. The important point in reviewing contracts is to clarify the contract between the company and the customers, and to take proper procedures so that customers and company do not have doubts, when we conducts audits for the contracts review, the department of the company to be audited depends on the business organization of the companies. For example, if the sales department has received orders from customers, the audit will be conducted for the sales department. If the sales department is located in the main office remote from the manufacturing plant, we visit the sales division of the main office in which the reviewing of contracts is actually implemented. However, if we cannot conduct an audit for the contract review in the sales division for some reason, we must audit the contract review between the sales division and the manufacturing plant. In such a case, it must be clearly stated in the certificate of registration that the products manufactured by the plant are to be supplied to the main office.

Please note that in the 1993 revision of ISO 9000 series standards, clarifying the requirements of existing standards is the first and major purpose. In the current requirements, the part regarding the "contract review" states that there is no need for documentation. The requirements simply state that the company "shall establish and maintain procedures."

After the 1993 revision, all requirement must be documented. The reviewing of contracts must be recorded to show in what manner it is being performed.

Document Control (Clause 4.5 of ISO 9001)

Document control is the most frequent item evaluated as nonconformity in our assessment, representing over 40 percent. It shows how unfamiliar companies are with documentation. However, it is said that this is common issues in all countries, not just Japan. This clause describes the details of how to control the necessary documents in a quality system.

All documents should be in accordance with their purpose, and approval must be made before issuing such documents by checking if they are correct and proper. Of course, this requires discussion with the division or section in charge and appropriate decision making at the proper level. When changes are made in the documents, the same procedure as documented must be taken. In addition, the provision requires that the document that is necessary in the workplace must always be filed in a place where such documents are required. Also, when a new document is issued, the divisions/sections must promptly remove obsolete documents from those divisions/sections after receiving the new document. All documents should be assigned with a document identification or number so that updating can be easily done. Also, the differences between obsolete and current documents should be clearly indicated where practical. Lastly, the provision requires that the company must have a master list or equivalent document control procedures so that the latest version of a document can be clarified.

In the audit related to document control, the most common nonconformity is that the identity of the person who gives the approval for documents is not clear. In order to introduce the ISO 9000 series standards, some companies change the person in charge of approval to the department head from the section head, or to the president from the department head. They attempt to upgrade their approval procedures from their existing procedures for document control. As a result, we discover that documents are approved by many different people. In some cases, the same route is not taken when documents have been changed. To prevent such inconsistency, simply document your existing procedures. If documents required approval by a section head or chief, simply document such procedures. When a change is made in the documents, take the same procedures mentioned in the documents.

During our audit, we often see that companies have difficulty in answering the question of how can they prove the work instructions in the manufacturing site are the up-to-date instructions. The work instructions must be controlled between the section issuing the work instructions and the manufacturing site. Control by the master list is one way of document control. For example, when the latest document is received, return the obsolete document, and the "received" stamp may be put on the master list. Please appropriately review how the latest-version documents are currently controlled in your companies.

Internal Quality Audit (Clause 4.17 of ISO 9001)

In this clause, we must pay particular attention to the requirement of "Audits shall be scheduled on the basis of the status and importance of the activity". This example of the schedule table is based on the internal quality audit plan by examining if there is a problem in quality activity, and if such a problem exists, in which department in the company.

Thus, the departments with particularly insufficient quality activity will need more frequent internal quality audits in comparison with other departments. It would also be a good method to perform an investigation to see if there is a problem, and if one exists, for what quality element in the quality activity of the company. A schedule table for audit frequency can then be developed based on these investigation results. However, this is only an example. Companies can use other suitable methods to satisfy the above requirements.

Internal Quality Auditing Program

Dept. \ Month	1	2	3	4	5	6	7	8	9	10	11	12	Responsible Person
Administration Dept.			X										
Sales Dept.					X						X		
Design Engineering Dept.				X			X			X			
Materials Dept.		X											
Manufacturing Dept.	X						X						
In-coming Inspection						X							
Out-going Inspection						X							
Q. A.						X							
Service									X				
Name of Auditor													

Where non-compliance come from in Quality management System ?

Internal Quality System Audit Records
(Materials Dept.)

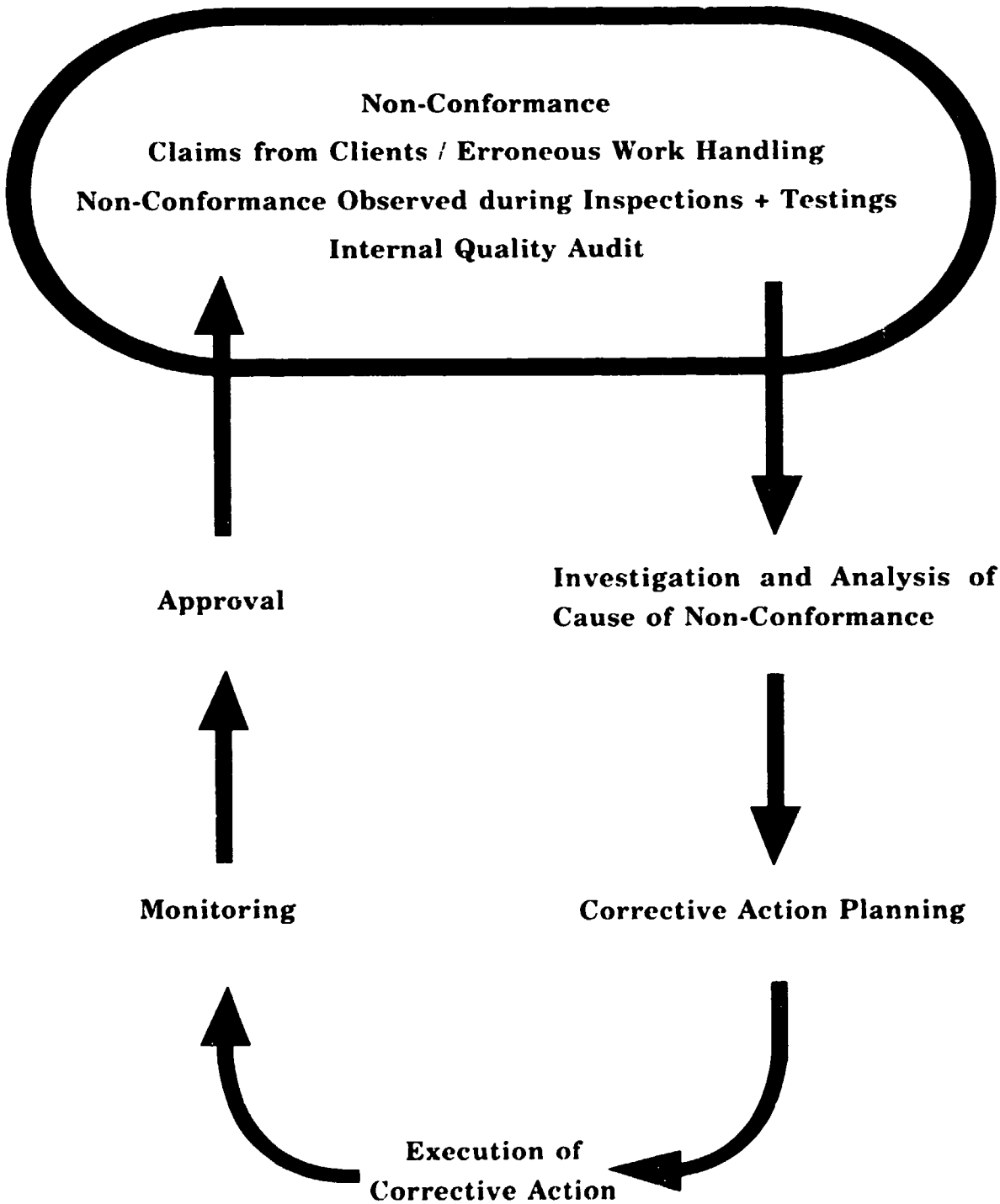
Items in ISO 9001		Non-conformance	Corrective Action
4. 1	X	4. 1 Management Responsibility	Tracing and Analysis of Non-conforming Points
4. 2			
4. 3	X	4. 3 Contract Review	
4. 4			
4. 5	X	4. 5 Document Control	
4. 6	X	4. 6 Purchasing	
4. 7			
4. 8			
4. 9			Corrective Action
4. 10			
4. 11			
4. 12			
4. 13	X	4.13 Control of Nonconforming Product	
4. 14	X	4.14 Corrective Action	
4. 15	X	4.15 Handling, Storage, Packaging & Delivery	
4. 16	X	4.16 Quality Records	
4. 17			
4. 18			
4. 19			
4. 20			Responsible Person in the Dept.
			Endorsed by
			Auditor

Corrective Action (Clause 4.14 of ISO 9001)

The item particularly weighed in our audit is this requirement.

As shown in the flowchart, the corrective measures start at the finding of every single nonconforming item. If a nonconforming item is found, the company shall establish the entire flow of analyzing the cause, planning and implementing the corrective actions, monitoring the actions and approval of the result. If a part is lacking in this flow, a nonconforming item will be detected through out audit.

Processing Route of Corrective Action



3rd day

SEMINAR ON

ACHIEVING COMPETITIVE QUALITY THROUGH STANDARDIZATION AND IMPLEMENTING QUALITY SYSTEM

Country Report Presentations on Education and Training Programme for Standardization and Quality Management

Presenters: Representatives of ASEAN Countries

Panel Discussion on Education and Training Programme for Standardization and Quality Management

Panel Leader: Mr. Kunio INOUE
Director for International
Standardization Affairs,
AIST, MITI

Panelists: ASEAN Representatives
DSN
UNIDO
Japanese Experts

Closing Ceremony

- Address by DSN
  Mr. Bambang HADIWIARDJO
- Closing Address by Director General of JSA
  Mr. Genichi FUKUHARA

26th – 28th, January 1993
The Borobudur Inter • Continental Jakarta

3rd day
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– Address by DSN
Mr. Bambang HADIWIARDJO

(MEMO)

(MEMO)

(MEMO)

3rd day
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– Closing Address by Director General of JSA
Mr. Genichi FUKUHARA

(MEMO)

(MEMO)

(MEMO)