JUSE

Societās Quālitātis

Vol 2 No 4 Sept/Oct 1988

Union of Japanese Scientists and Engineers 5-10-11 Sendagaya, Shibuya-ku, Tokyo 151 JAPAN

QUALITY CONTROL ACTIVITIES ON SOFTWARE PRODUCTION

by Dr. Ayatomo KANNO, Professor, Science University of Tokyo

— from the orientations of the 8th Quality Control Symposium on Software Production —

There are many lessons which can be learned from technologically advanced companies in non-software industries with regard to total quality control in the production of software goods. What deserves our attention here is the fact that the success of quality control in Japan is not merely the result of success in individual companies, but in the overall rise in the levels of quality control of the industry as a whole. This is in a sense a natural product of Japan evolved from her unique corporate and national culture.

It is clear today that productivity improvement can only be rightfully measured in terms of the realized quality assurance over the life of the product. Quality-assurance is a customer oriented total quality control (TQC) concept which is achieved by coordinating quality (Q), cost (C), delivery (D) and safety (S). This concept applies to software as well as to hardware. We must be open to new software engineering methods developed in other nations. But at the same time we must also effectively use production management technique and motivation measures that are typically Japanese. A software logic must be developed on sure moral foundations. These attitudes allow us to make good use of feedback on operational performance or design review. We must build a routine system in which we allow data to speak for themselves and listen to them. When this becomes a habit, all available methods become complimentary rather than substitutional.

Considering these, we can readily apply QC Circle activities which are based on the idea of encouraging employees to exercise autonomy, self-enlightenment and participate in a process of mutual enlightenment in small group activities within the workplace. Central attributes of Japanese corporate management philosophy consist in multiple use of manpower, i.e., to expose employees to various job functions. The core philosophy of the production sector lies in applying total quality control. A sense of achievement is an important motivation for overcoming setbacks through participatory cooperation and recognition, when efforts prove successful. Software industry can be the ideal industry for Japan to maximize the national potential which is a product of successful total quality control. These skills will contribute to building a sophisticated information society befitting the humanking. These energetic programs deserve attention as potentially contributing to establishing a sound basis for opening the door for exporting software production technology.

As with other industrial products, there are no golden rule for quality control on software products, there are no single key that will lead to success. Excessive dependence

CONTENTS

Phone: 03-352-2231 Fax: 03-225-1813 Telex: 02322485 JUSE J

on methods advocated by western scholars and their followers based merely on their personal experiences and trials are idle sophistry. Practical wisdom must enable us to adopt appropriate methods and means best suited to certain conditions at a given time. One must have the courage to speak up and to implement them. And to do these in a harmonious manner is the manifestation of culture nurtured among our people.

Software production technologies cannot be isolated from the culture in which they are produced. One should master and use wisdom and information passed down from our forefathers but one should always be prepared to reexamine them in the light of th real world. I believe that true international solidarity will be maintained when we squarely face up to the differences in the national cultures.

There is a great deal of difference in the way we engage in production or the motives that run our lives. Unless we are aware of these differences, there will be many misunderstandings. We must, however, bear in mind that it is not an easy task to have the correct understanding of these differences. But without this understanding there cannot be bridges built across cultures. It is therefore essential that we mutually respect each other's culture. We must not be influenced by superficial advantages or the prospect of immediate profits.

We do not always realize that our perception or our ways of thinking, or our reaction to quality control are bound by our cultures. We do not always realize that people think differently, perceive things differently and act differently when they come from cultures which are different from ours. In order to facilitate communication among peoples of different cultures, we must make our culture known to our friends but start our communication by knowing the differences.

Tools are necessary for quality control of software products. Improvements in network and work station installations and prototypes are all effective. Use of knowledge based on engineering is also important. We must not neglect to study experiences gained from Japanese style quality control which is to seek harmony with the people around, share knowledge and continue to improve our efforts in all aspects. From the point of view of the importance of mutual enlightenment I believe this Symposium is of important value.

Many attempts are being made to further improve software products and they are summarized in the following table. Naturally they require consistant review and improvement.

★

Peripheral Trends Surrounding Software Products and Summary of Measures

Order	Trend	Content	Summary of Measures
1	Internationalization	The globe is getting smaller, and clashes are seen among different cultures. Respect for national traits will be necessary in order to share civilization.	Division of labor are required to bring our national traits.
2	Highly educated society	Less regard for academic careers.	Greater respect for individual's capabilities will be required.
3	Ageing society	People will have to work throughout their lifetime.	Lifelong education and multifaceted lifestyle approach will be required.
4	Systemization	Fear of errors will increase.	Maintaining harmony between logic and moral will become important.
5	Enlargement in scale	Project management becomes difficult.	Consideration in maintaining motivation will be required.
6	Complex systems	Evaluations will become difficult.	Measures to cope with variations and diverging aspects will be required.
7	Rise in stress factors	Unable to sleep at night when thinking about a system one is involved in.	Measures to detect anticipatory symptoms to maintain mental and physical health.
8	Amaturization	Can not predict how the systems will be used.	Stress review of timely measures and diffusion of knowledge.

WINNERS OF THE 1988 DEMING PRIZES DECLARED

The Deming Prize Committee announced the following person and organizations as the winners of the Deming Prize (for Individual), the Deming Application Prize and the Nikkei Quality Control Literature Prize for 1988 at its meeting held on October 12, 1988 at the Keidanren Building at Otemachi in Tokyo. The winners were decided by the Committee based on the selections made by the sub-committees for the respective prizes which met on October 1.

Deming Prize (for Individual)

Mr. Ren-ichi TAKENAKA (Takenaka Komuten Co., Ltd., Chairman)

Mr. Takenaka was the pioneer in introducing TQC to the construction industry in 1976. In 1979 he was awarded the Deming Application Prize, which gave encouragement to the industry. He also extended great efforts to educating and diffusing TQC throughout the "cooperative" companies. Under his influence, internal meetings were held twice a year to explain the present status of TQC activities with the attendance of the Chairman and President and others to enlighten the employees and penetrate TQC activities.

Deming Application Prize

AISIN KEIKINZOKU CO., LTD.
President; Mr. Michiji INABA
Employee; 815
Main Products; Molding/Casting for Automobile Parts

Introduced TQC in 1983. Having learned lessons from the opinions given by the judges when receiving the Deming Application Prize for medium and small enterprises, the company expanded the TQC activities covering itself into a company capable of predicting future market and customer requirements.

ASMO CO., LTD.
President; Mr. Toshi SUDA
Employee; 5400
Main Products; Small Size Motors for Automobile

Under the strong leadership of the top management, the company promoted TQC activities, which led to the improvement in such areas as new product and technology development, quality assurance systemization, source control and design inspection.

FUJI TEKKO CO., LTD.
President; Mr. Akira TANI
Employee; 1300
Main Products; Car Transmissions

In order to realize a conversion from being a subcontractor to a manufacturer in a specialized field, the company made concerted efforts to promote TQC. As a result, a number of achievements were made in quality of new products, cost and delivery.

Deming Application Prize for Division

JOBAN HAWAIIAN CENTER, JOBAN KOSAN CO., LTD.
Executive Director; Mr. Zenji HIRAKAWA
Employee; 400
Main Business; Leisure, Amusement, Hotel

TQC was introduced in 1982 for the purpose of training personnel and improving the organizational and functional structure of the company. For six years following the introduction, all members of the division cooperated successfully to improve the services and quality of their work.

Award for Factory by Deming Prize Committee

MUSASHINO BREWERY, SUNTORY CO., LTD.
Plant Manager; Mr. Yuichiro OHTANI
Employee; 240
Main Products; Beer

Beer is recognized as a difficult product, in the sense that it is hard to understand and define customers' taste, and meet the high level of sanitary requirement. All members at the factory are commended for the successful development of new products while maintaining the quality level and reducing the cost through their participation in the TQC activities.

NIKKEI QUALITY CONTROL LITERATURE PRIZE WINNERS

Mr. Tsuneo AJIKI: "Handohtai Device no Shinraisei Gijyutsu (in Japanese)**"**
"Reliability Engineering of Semiconductor Device"
JUSE Press Co., Ltd.

Dr. Kenji KUROGANE: "Kinohbetsu Kanri Katsuyo no Jissai (in Japanese)**"**
"Practical Guide for Cross Functional Management"
Japanese Standards Association

Dr. Masao KOGURE:
"Nihon no TQC (in Japanese)**"**
"The Japanese TQC-Its Review and New Evolution"
JUSE Press Co., Ltd.

DOKABEN CIRCLE, KOMATSU, LTD.: "Injector Kumitate Chyokkohritsu 100% e Chosen (in Japanese)**"**
"Our Challenge to Complete Fabrication Rate of Injector Units" Monthly Magazine "QC Circle" of JUSE

CHANGES IN CONSUMER TRENDS

Using Time Series Factor Analysis — From the Paper Presented to the 18th Symposium on Sensory Evaluation —

Hisanori WATANABE, Tokyo Broadcasting System, Inc.

1. Objectives of the Research

Recently there has been many books published on marketing and among them are numerous books on consumer psychology and behavior. Many of these are, however, subjective accounts of impressions on phenomena. They tend to be journalistic in a bad sense, that is describing trends in value laden language such as "emotional" and "typically new generation."

This research aims to emperically analyze Japanese consumer perception based on the national survey data of the JNN Data Bank. For over 15 years the JNN Data Bank has accumulated data on consumer perception and consumption pattern. By utilizing this data, we have attempted to identify whether or not the Japanese consumers said to have changed dramatically, has in fact changed, and if so, grasp, such changes on a numerical basis, to what extent, in what areas.

Since there is massive amount of data on consumer perception and behavior stored in the JNN Data Bank, we must summarize information in order to make our own analysis. Time series factor analysis was employed in order to identify the intricate aspects of consumer perception from multiple dimensions.

2. On JNN Data Bank

JNN Data Bank which forms the basis of this research is based on comprehensive survey conducted twice a year (May and October) jointly by 25 television stations throughout the nation with TBS (which is a JNN network) serving as the key station. Research centers on the following areas:

1) Audience research (contact with mass-media)
2) Life style research (consumer awareness of behavior and daily life)
3) Brand name identification (brand names used and purchased).

Since the first in 1971, the survey has been conducted twice yearly and as many items have been recurrently surveyed they provide valuable time series data.

Twenty-eight categories have been selected from the second category on life style for the purpose of this research. They have been chosen for their utility in providing a long term observation on the attitudes and mode of consumer shopping.

3. On Time Series Factor Analysis

In ordinary factor analysis, a matrix composed of sample numbers times survey items, is used to identify their coefficient of correlations. Vector which best explains the coefficient of correlations is designated as the first factor, vector which next best explains it directly interacting with the first, as the second and so on.

Time series factor analysis employed here is based on the same concept as P-technique factor analysis which is short for Gilfords's "psychiatric measurement method." According to him the P-technique factor analysis is defined as "illustrating the change of an individual member in a mother group under a given circumstance. A given circumstance is a sample extraction of an activity of a day, a week or a month. By identifying the correlation among these measurement data; common factors forming the basis can be determined by using the covariant shift of the observed characteristics."

Owing to the nature of the calculation, this will involve factor analysis of the cross table expressed as (items) times (year). There are, however, problems in using the product rate coefficient of correlations. A product sum matrix may offer better framework for summarizing the cross table. With these conditional observations factor analysis based on coefficient of correlations was used for the purpose of this research.

4. Analytic Procedures Employed in the Research

As accuracy is required in the time series response to the items surveyed, data for May for each year from 1976 to 1988 was extracted from the JNN Data Bank. The number of samples was approximately 3100ss for each survey.

Twenty-eight items relating to "attitudes and mode of shopping" observed over thirteen years were used in this analysis.

5. Result of Analysis

(Result of Analysis 1)

Through the time series factor analysis of data (items times year), the following three factors were identified.

Factor 1 (explanatory power: 91.9%)

Consumer attitudes were consistently observed over thirteen years from 1976 to 1988. Age of the target con-

sumers was between 13 and 59. What emerges is a relatively conservative outlook of the consumer. They tended to "use the item as long as they were serviceable." They "studied catalogues before making an expensive purchase" and tended to "distrust mail order shopping." They also saw themselves as "wasteful spenders."

Factor 2 (explanatory power: 5.0%)

A change in consumer attitude was observed from around 1981 and 1982. Propensity to purchase well-known brand items started to decline from about that time after reaching a peak in 1980. In its place an image of price conscious consumer emerges. He will still "study catalogues before making expensive purchase" but he tended to chose price rather than the brandname "as long as it is cheap manufacturer brandname is not important." He is at the same time an "impulse buyer" and regarded himself as "wasteful spender." These implications are contradictory and not clear cut.

Factor 3 (explanatory power: 1.3%)

The plus peak is observed in 1978 while the minus peak is seen in 1982 with level curve thereafter.

6. Observation and Summary

Factors 2 and 3 suggest the decline in the consumer preference for well-known brands in two respects.

One is the trend indicated in factor 3 which suggests a separation from bandnames associated with the mood of the buyer. A simple image of the purse-tight shopper emerged after the second oil crisis as observed in such responses as "I did not buy it because of premium" or "will do without it if it is too expensive." Most consumers "studied catalogues before making expensive purchases" and tended to buy at "bargain sales." This may be interpreted as a passive spending attitude which continued until 1981 but diminished thereafter.

The other type is as seen in factor 2 which is not necessarily a simple indication that the consumer is a reliable purchaser. Along with a more positive consumption attitudes such as using information wisely as observed in his habit of carefully studying catalogues, he still tended to buy on impulse or mood. He is a wasteful spender but is shifting away from brandnames. He does "not insist on manufacturer brandname if the price is cheap." This trend becomes stronger after 1982.

As seen in these observations, time series factor analysis on actually measured data over a long period of time permit both the short and long term analysis. Even the shorter behavior trends can be observed. Keeping in mind that these short wave trends occur simultaneously, we can effectively analyze the current consumer profile.

The 8th Quality Control Symposium on Software Production

The 8th Quality Control Symposium on Software Production was held on September 16 and 17 at Nokyo Building in Otemachi, Tokyo. After a total of 28 reports presented at two places (A and B) with 14 reports each, a panel discussion titled "Present situation and problems of the demand analysis in the development of large scale systems" was carried out. The number of participants was 392.

The following three reports among those presented at the 7th symposium previous year, were awarded the best prize:

"Reduction of man-hours for development by developing software parts"
by Kumiko Koh, Nippon Electric Co., Ltd.

"Guarantee of reliability and safety by appropriate control of software — by integrating internal restraint function —"
by Takao Nakamura, Sumitomo 3M Ltd.

"An experiment with automatic diagnosis using quantitative quality data of software development process"
by Noriko Hashimoto, Fujitsu Ltd.

The 18th Symposium on Sensory Evaluation

The 18th Symposium on Sensory Evaluation was held on September 20 and 21 at Kokuyo Hall at Shinagawa in Tokyo under the theme of "Consumer trend and product planning." In addition to two special lectures, 26 reports were presented at the following 5 sessions with a total of 197 participants.

Session I	Automatization of sensory evaluation and sensor technology
Session II	Consumer trend and product planning
Session III	Environment and clothing
Session IV	Image evaluation by visual inspection
Session V	Product planning and factor analysis

The 4th Symposium on Quality Control for Service Industry

The Symposium was held on June 23 and 24 at Kokuyo Hall at Shinagawa in Tokyo under the theme of "Service industry and quality."

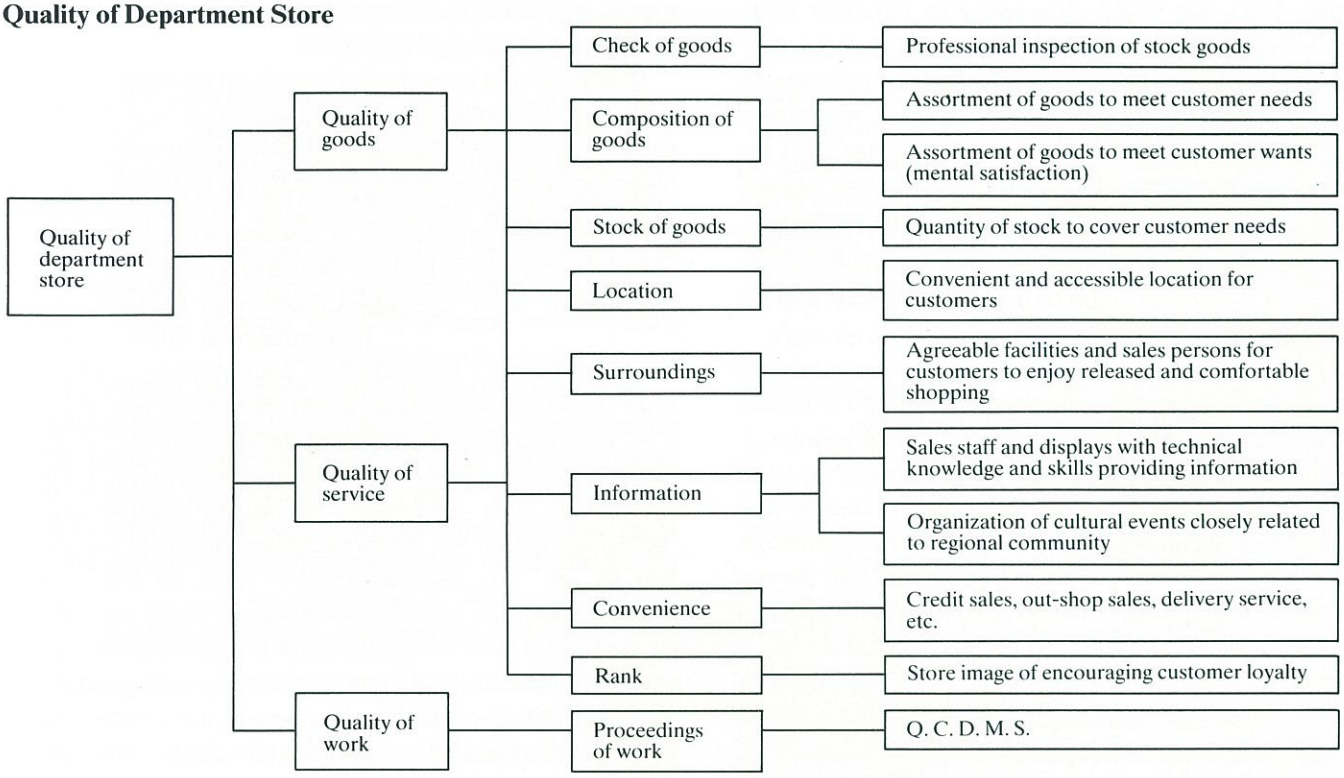
Session I	Service industry and TQC
Session II	Service industry and QC Circle
Session III	Measurement of quality on service

After the presentation of 10 reports, panel discussion was held under the symposium theme. There were 104 participants.

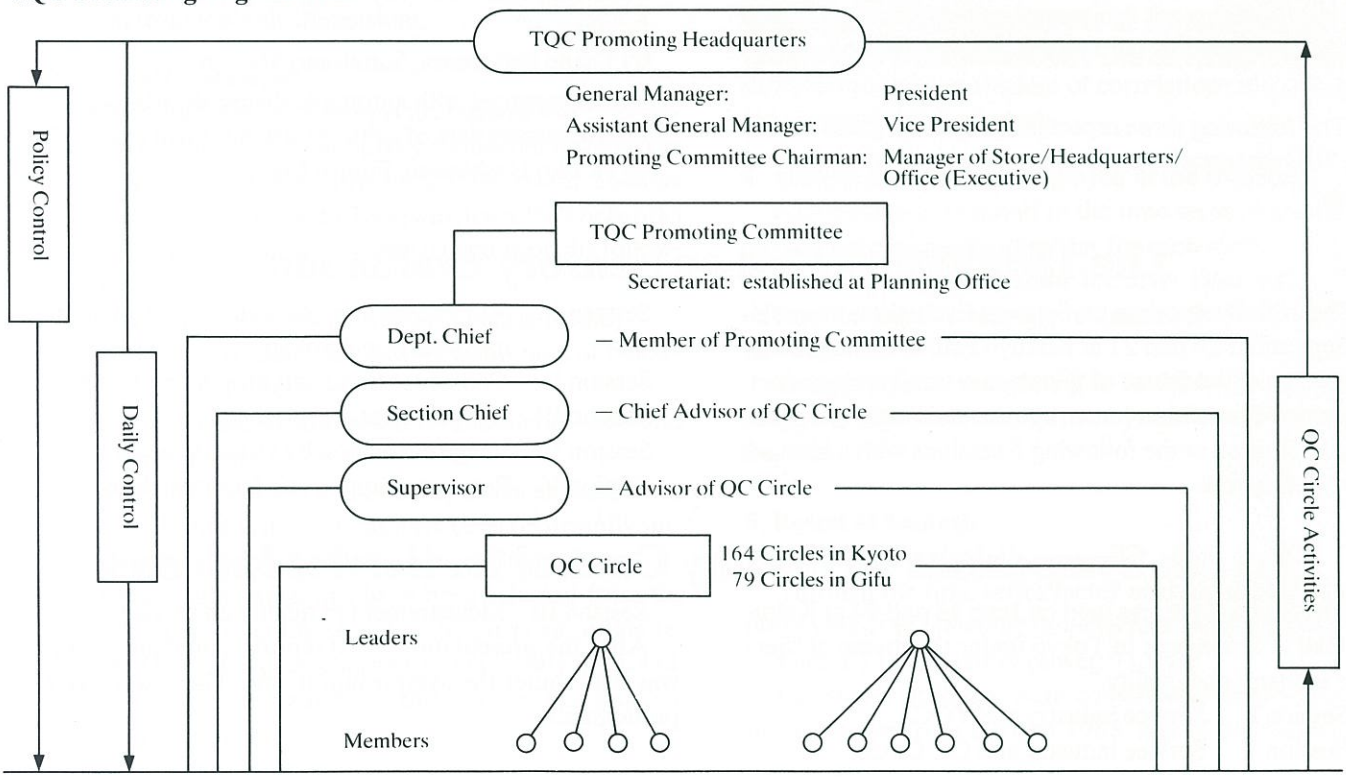
QUALITY OF DEPARTMENT STORES AND TQC PROMOTING ORGANIZATION

— from the presentation by Kyoto Kintetsu Department Store at the 4th Symposium on Quality Control for Service Industry —

Quality of Department Store



TQC Promoting Organization



Dr. W. E. Deming Gives Special Lecture at JUSE International TQC Seminar

The 1988 JUSE International Seminar on TQC which started on October 17, 1988 had 44 participants from 13 countries. Dr. W. Edwards Deming who was visiting Japan under the invitation of JUSE gave a special lecture titled "Some Faulty Practices of Management in the Western World" on the evening of the second day of the seminar. The lecture was so invigorating that it was hard to believe that it was given by someone who had turned 88 years old four days earlier. The participants sent roaring applause and sought his autographs and photographs. Following two-day visits to various business firms, there was a lecture by Prof. K. Ishikawa on the 25th. The entire 8-day program concluded on the 26th.

JUSE 5th Reliability Study Mission Visits Europe

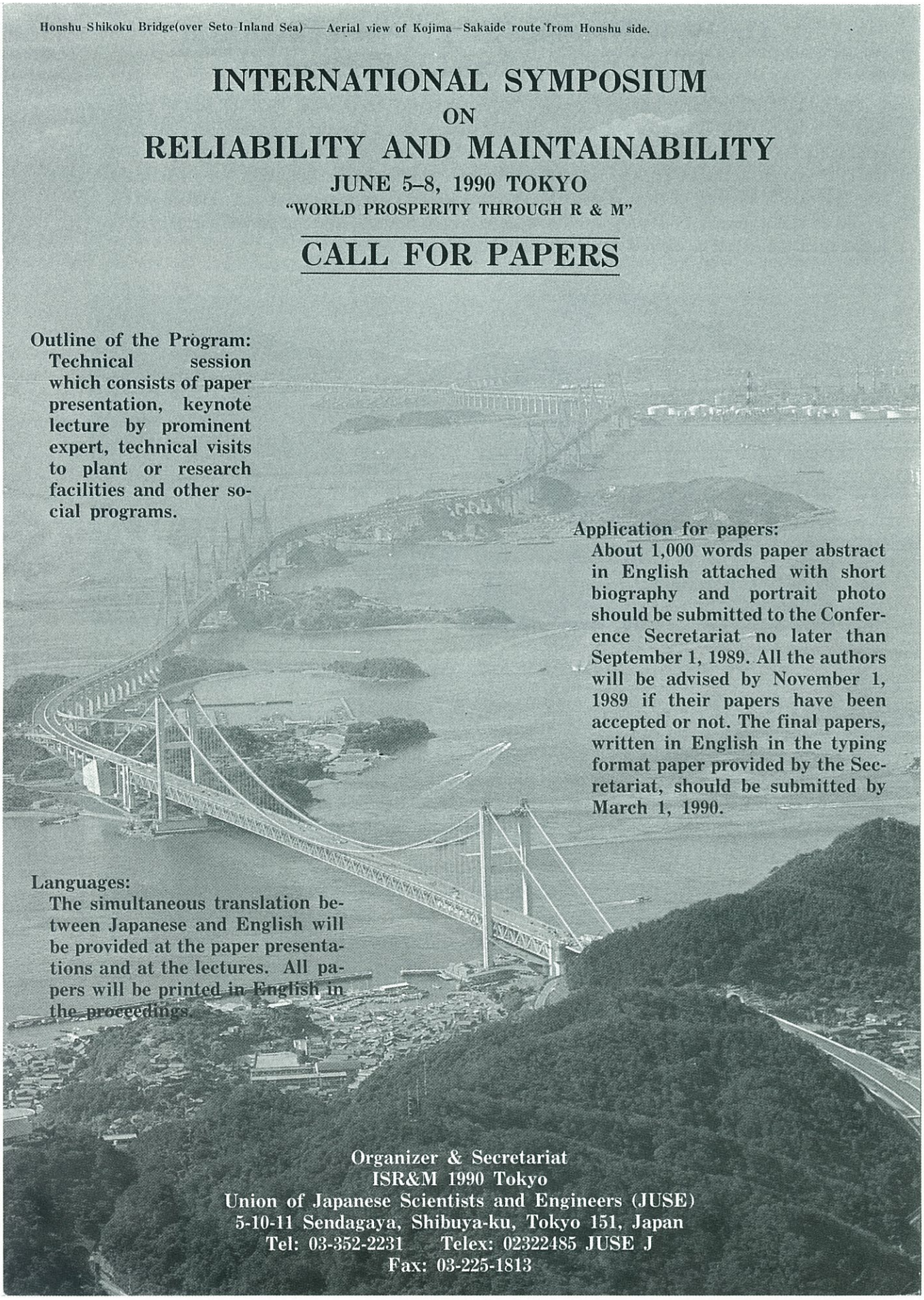
JUSE 5th Reliability Study Mission, consisting of 17 members and headed by Prof. Masafumi Sasaki of the National Defense Academy, left Japan on September 24, 1988. After visiting West Germany, they attended the 6th International Conference on Reliability and Maintainability which was held for five days in Strasbourg, France and returned to Japan on October 9. The mission visited Siemens and BMW in West Germany and C.N.E.T. and Bull in France.

ICQCC'88 in Taipei

The 1988 International Convention of QC Circle will be held on November 21-22 in Taipei, Taiwan. There are entries from 17 countries/areas as of October 17 and about 1,500 participants (1,200 from Taiwan and 300 from other countries) are expected to attend.

The site of the 1989 Convention, which was originally scheduled to be held in Kuala Lumpur but subsequently cancelled, will be discussed and determined at the meeting in Taipei. The scheduled convention sites are Tokyo for 1990, Jakarta for 1991 and Manila for 1992.

Contact address of ICQCC'88—Taipei is:
ICQCC'88—Taipei Standing Committee
Association of Pioneer Quality Control Research
95 Chung Cheng Rd., Chung-li, Tao Yuan, Taiwan
Tel. (03) 425-3181, 425-2436
Fax. (03) 422-2745



Honshu-Shikoku Bridge(over Seto-Inland Sea)——Aerial view of Kojima-Sakaide route from Honshu side.

INTERNATIONAL SYMPOSIUM
ON
RELIABILITY AND MAINTAINABILITY

JUNE 5–8, 1990 TOKYO

"WORLD PROSPERITY THROUGH R & M"

CALL FOR PAPERS

Outline of the Program:
Technical session which consists of paper presentation, keynote lecture by prominent expert, technical visits to plant or research facilities and other social programs.

Application for papers:
About 1,000 words paper abstract in English attached with short biography and portrait photo should be submitted to the Conference Secretariat no later than September 1, 1989. All the authors will be advised by November 1, 1989 if their papers have been accepted or not. The final papers, written in English in the typing format paper provided by the Secretariat, should be submitted by March 1, 1990.

Languages:
The simultaneous translation between Japanese and English will be provided at the paper presentations and at the lectures. All papers will be printed in English in the proceedings.

Organizer & Secretariat
ISR&M 1990 Tokyo
Union of Japanese Scientists and Engineers (JUSE)
5-10-11 Sendagaya, Shibuya-ku, Tokyo 151, Japan
Tel: 03-352-2231 Telex: 02322485 JUSE J
Fax: 03-225-1813