

The QC Circle Phenomenon

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The QC Circle is a small group of departmental work leaders and line operators who have volunteered to spend time outside of their regular hours to help solve departmental quality problems. The QC Circle movement originated in Japan about four years ago. A phenomenal rate of growth has taken place. The effect of the movement on the Japanese drive toward quality leadership may well be dramatic.

On the afternoon of Wednesday, April 20, 1966, a Westerner visiting the Daiichi Seimei Hall in central Tokyo would have witnessed a remarkable sight. The meeting in progress in this historic auditorium (General Douglas MacArthur staged his large conferences here) was billed as the 14th QC Circle Conference. It had started at 1:00 p.m., and, after some ceremonial addresses, the technical program got under way. Seven Japanese companies presented reports on improvements they had made on a variety of company problems. For example, the first report, by Takenosuke Kakegawa of the Stereophonic plant of Tokyo Sanyo Electric Company, was on "Finding a Solution to Trouble About Solder." The seventh report was by a trio, Shoko Yazawa, Reiko Yamada, and Mitsuko Yamazaki, from the Car Radio Division of Matsushita Communication Industrial Company, who reported on "Decrease of Car Radio Defects in Final Assembly." Each report was allowed 15 minutes, with 7 added minutes for discussion from the floor.

To understand what was so remarkable about the conference, let us look in detail at the presentation made by the trio from Matsushita. They had taken on a project to reduce final assembly defects in the radios which Matsushita makes for sale and export to automobile companies. From information of assembly rejections and customer troubles, the trio prepared a Pareto analysis,⁽¹⁾ and established that the number one defect was loose control knobs. This "public enemy number one" accounted for 80 percent of all final assembly defects. The number two defect, missing mounting brackets, comprised 13 percent of all defects. The remaining 7 percent were assorted minor defects. Collectively, all defects ran at a level of 2.2 percent of the product.

Next, the trio considered each of the two principal defects (loose control knobs and missing mounting brackets) as a project requiring a breakthrough to a new level.

The control knob is designed with a blind hole to mate with the control shaft. To provide enough friction to hold the knob tight, the shaft is slotted to create two springy sides which are then spread with a screwdriver during the final assembly operation.

However, there was a difference of opinion as to the cause of loose control knobs – was it parts, operators, tools, methods? The trio mapped out the variables on an Ishikawa diagram, as shown in Fig. 1. This is described in Reference 2.

From analysis and from some experimentation, it was established that the two main causes were:

1. Variation in slot size when enlarged by different operators.
2. Screwdriver not well suited for the operation.

A solution was found by providing screwdrivers with a parallel-sided blade instead of a tapered blade.

The missing mounting brackets were the second project. (These brackets are used in the car factory to mount the radio to the automobile dashboard). The cause of missing brackets was "operator error." Radio assemblers in a prior stage of manufacture have a wide range of operations to perform, and sometimes omit one or both mounting brackets.

The solution was to fool-proof the final assembly operation. An assembly jig had been needed anyhow as a holding device during final assembly. Now the job was built, and built in such a way that the mounting brackets were the means of supporting the radios in the jig. This simplified handling the radio during final assembly and also eliminated shipment of radios with missing mounting brackets.

These two quality breakthroughs lowered the final assembly defect rate from 2.2 percent to 0.6 percent.

The trio had divided up their 15 minute presentation into three sections of five minutes each. Shoko led off, followed by Reiko and Mitsuko, respectively. In the manner of such Japanese conferences, the visual aids were large painted sheets of paper hung from a long, horizontal, wooden two-by-four, like wash on the line. These sheets showed sketches of the parts, the flow of the process, the methods of analysis, and charts of the results obtained. The trio made their presentation with a sure-footed grasp of their subject. Even to this author, whose knowledge of Japanese is minimal, the explanation was clear. The well-prepared visual aids helped quite a bit. During the seven minute question period, Mitsuko, being the final speaker, also fielded the questions from the floor. This was likewise a virtuoso performance, for Mitsuko was plenty alert, and was ready with the answers before the questions were half finished.

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What was remarkable about all this was the fact that the presentation of the seven reports at this conference involved not a single manager, supervisor, engineer or other management specialist; nobody from what an American calls the "exempt payroll." Instead, the speakers were mostly what we call "working foremen" or "work leaders." (The usual Japanese word is "GEMBA-CHO.") Some speakers were production operators off the assembly floor. All were either leaders or members of "QC Circles." *Shoko, Reiko and Mitsuko were girls off the assembly line.* Their full time job is to assemble car radios. Shoko and Reiko were 21 and 23 years old, respectively. *Mitsuko was 18!*

Each of these seven reports represented the work of a "QC Circle," QC meaning Quality Control. This QC Circle movement, which began in 1962, has been snowballing into something massive. As of April 1966, there were already over 10,000 such circles in Japan, and every one of them exhibited the following characteristics:

- the membership consists solely of people at the bottom of the company organization – non-supervisors and working supervisors;
- membership is voluntary;
- the work of the circles is mostly conducted outside of regular hours;
- compensation for this out-of-hours work varies from full time down to nothing.

To understand how a QC Circle, such as the three young girls off the assembly line, could take on and complete a project like improving the assembly quality of car radios, it is necessary to go back a few years, and in some respects, a few centuries. We will shortly return to this.

Results to Date

There is a good measure of results achieved by the QC Circle movement because a measuring stick has been built in. Each Circle is required, as part of each project undertaken, to evaluate the results. From these evaluations, the editors of GEMBA TO QC (Quality Control for the Foreman) have determined that:

- the Circles have averaged savings of about \$3000 each;
- the 10,000 Circles have collectively achieved \$30 million in improvements.

This is astounding for a movement which is still only a few years old. No less significant is the fact that this has been done without pre-empting the time of the managers and engineers, who remain free to devote themselves to inter-departmental and upper level projects. The idea that these Japanese companies have found a way of going through all operations with a fine tooth comb, and without adding to the burdens of the managers and engineers is something to ponder on.

The main effect has been in control, this being inherently the basic role which can be played by the QC Circle. There has been much analysis of sporadic troubles, and much done to reduce variation and to prevent recurrence. More and sharper control tools have been made available to the factory floor: clearer interpretation of standards; more complete

instrumentation; better data feedback; control charts.

Part of the improvement in control has been an increased awareness of the sequence of steps in the control cycle. As quality improvements are worked out, action is taken to incorporate the improvement into revised, standardized methods. Further steps are then taken to set up the fool-proofing, the feedback and the alarms which will hold the gains.

Beyond improvement of control, a gratifying proportion of the projects are of a breakthrough nature – by systematic study they take the department to better levels of performance, levels not previously attained.

The intangible by-products of the foregoing results are evident but not measurable:

- the foreman's ability to control and lead his department is increased. His job of promulgating instructions is noticeably eased.
- the operators have greater interest in their job, and a higher morale. This extends to people formerly indifferent, and to the older age group as well.
- the relationship between the staff people and the line workers has improved noticeably.
- there is being developed, on the factory floor, a generation of workers with successful experience in use of what have to date been regarded as management tools. The potential of these workers to become the managers of tomorrow is simply breathtaking.

How the QC Circles Started

The QC Circles are not some isolated invention; they are a very logical outcome of the Japanese drive for training and accomplishment in quality control. It is easy to trace this evolution.

The authoritative Japanese narratives (by Koyanagi, Ishikawa and others) all trace formal training in modern quality control methods to the early 1950's. The seed courses were Deming's lectures in statistical methodology (1950) and Juran's courses on Management of Quality Control (1954). The Japanese zeal for learning and for self-sufficiency brought out a follow-up of numerous courses, by local experts, for engineers and managers at all levels.

The Japanese were not content to conduct this training for engineers and the supervisory levels. Japanese concepts of organizing work do not follow the strict Taylor concept of division of work, i.e., planning to be done by the engineers, and execution to be done by the foremen and workers. Instead, the Japanese leave a good deal of planning and creativity to be carried out by the production force.

These same concepts of organizing work have carried over into the quality function. The broad based Quality Control Department, with its arrays of Quality Control Engineers, Reliability Engineers and still other specialist categories, so commonly found in America, is a minority organization form in Japan. The Japanese approach has been to teach quality control methodology to managers in *all* functions – Research, Development, Design, Production, Purchasing, Sales, Accounting etc. With such a broad base of training, the need for a broadly-based Quality Control Department is diminished, as is the need for specialist

engineers. (Japanese engineers are seldom specialized as Quality Control Engineers.) As a consequence, the Quality Control Department in Japan has mainly an advisory, consulting and promotional role. A minority of these departments do conduct quality planning. More usually, the various line departments have the responsibility for achieving quality by utilizing modern quality control methods while the quality audit is done by a specialized staff department.

Under this Japanese system of organizing work it became logical to extend training in quality control to the category of "Gemba-cho." The Gembacho is a sort of "working foreman," i.e., he is partly a work leader and teacher, and sometimes a production worker. Since this category of Gemba-cho consists of many thousands of people, it was necessary to resort to mass media of training. Japanese ingenuity rose to the occasion by creating new training forms as well as by adapting conventional forms.

The conventional forms consisted of textbooks and manuals such as Professor Ishikawa's textbook, introduction to *Quality Control*. First published in 1952, the third edition (1964 and 1966) has grown to 350 pages and to two volumes, and now includes much on management of quality control. The more recent (1959-1960) *Quality Control Text Book for Foremen* runs to 234 pages and provides cook-book information on quality improvement as well as quality control. This manual is edited by Professor Ishikawa's group of consultants in the Japanese Union of Scientists and Engineers (JUSE) and is published by JUSE Press Co.

Turning now to the unconventional training forms, the first of these was the radio broadcast courses in quality control. The pioneering course was a series of 91 lessons of 15 minutes each, broadcast daily from June through September 1956, and repeated later in the year. This course was repeated annually through 1962. The radio text for these courses sold over 100,000 copies!

A television lecture series was next. The first of these ran from April 1960 to March 1961 and consisted of a series of weekly lectures, each 30 minutes long.

The journal "Quality Control for the Foreman" (GEMBA TO QC) was launched in 1962 on a quarterly basis. Now on a monthly basis, it has a lively, practical content, and a circulation of over 28,000 copies.

Annual Foremen's QC Conferences started in November 1962. (November is designated as Quality month in all of Japan, and the Q flags really fly all over.) These conferences are staged in various industrial cities, with a burgeoning attendance.

With such a background, the logic of extending training to the rank and file becomes more evident. Given an extensive training of the Gemba-cho, his ability to put this training to use is in proportion to the use he can make of the resources around him, and especially the human resources. It remained to find a mechanism for using these human resources, and this mechanism turned out to be the QC Circle.

Evidently the initiative for the QC Circle concept came from the editors of GEMBA TO

QC, who saw in the non-supervisors an immense potential for contribution through training and motivation. The QC Circle idea was born in about 1962. By August 1966, there were about 8,000 *registered* circles, with a membership of over 120,000 employees. The unregistered circles probably involve an even greater number of employees.

The regional and national organization for QC Circles followed as a matter of course. The journal GEMBA TO QC became, naturally, a national journal for the QC Circles as well. The first regional conference was held in May 1963. A little over three years later, the 20th conference was in session.

How the QC Circle Movement Spreads

Now that these circles already number in the thousands, the pattern for creating new ones has become well established.

The concept makes its way into a company through awareness of successful results in other companies. This awareness comes from the numerous success stories in GEMBA TO QC; from attendance at the annual foremen's QC conferences; from attendance at QC Circle conferences; from visiting companies which have active programs going. Further stimulus comes from the internal QC staff people or from the external consultants who are on the staff of GEMBA TO QC, or of the Japanese Union of Scientists and Engineers.

As the gathering awareness creates a favorable atmosphere, various Gemba encourage the formation of QC Circles in their departments. Each circle is trained, mainly off the job, by a combination of three training methods.

1. Training by the book. This is a course, of 10 to 20 hours duration, in specific techniques, mainly:
 - The Pareto analysis to find the "vital few" problems
 - The Cause and Effect Diagram (The Ishikawa diagram) .
 - Histograms
 - Graphs
 - Control charts
 - Stratification
 - Binomial probability paper
2. Discussion of cases worked out in other companies, as reported in GEMBA TO QC
3. Discussion of internal quality problems, solved and unsolved.

With the training behind them, the Circle identifies a problem to be solved, tackles it and solves it. It then tackles another, and another. (Some have solved over 60 problems.) The record of successful internal solutions breeds other QC Circles within the same company, and the movement spreads. As the number of Circles in one company grows, there arise new opportunities for stimulating interest and action. Companies organize in-house conferences of their QC Circles, providing opportunity for publicizing results and for giving

recognition to the Circles who achieved the results.

At the Matsushita Training Center near Osaka, I saw a large training facility devoted to QC Circle activities. The walls of this large room were literally papered with the record of projects successfully carried out at various plants – projects on transformers, tuners, speakers, resistors, etc. An example is shown in Fig. 2. In addition to the reports, there were pictures of the members of the Circles which had achieved the results, along with other forms of recognition.

In the Toyota Motor Company plant in Nagoya, I saw use made of a most interesting information center in each shop department. The information center consists mainly of a large bulletin board, plus satellite boards for exhibiting samples of defects and such. The bulletin boards commonly exhibit:

- a diagram of the flow of the process, including location of control stations as well as control points and control levels at each station;
- the Pareto analysis for key defects;
- the Ishikawa cause and effect diagram for these key defects;
- data on current quality performance, usually in the form of control charts. (The bulletin boards also carry some non-quality information such as departmental cost trends, the safety record, etc.)

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An interesting diagram on one board was a matrix listing on one axis the operations performed in the department, and on the other axis the names of the operators. The chart showed which operators had qualified to perform which operations, and was displayed for information and motivation.

The most successful QC Circles have the opportunity to get their projects published in GEMBA TO QC, and to attend the QC Circle conferences. These are important forms of recognition to the foremen and workers involved, many of whom are astonishingly young. One of the interesting projects reported on the walls of the Matsushita Training Center was by a QC Circle of four men and three girls whose ages ranged from 16 to 23, with an average of 20.3 (Matsushita's car radio assembly line has several QC Circles in addition to that of Shoko, Reiko and Mitsuko. The ages of these circle members range from 15 to 26, the average being 19.)

The published reports of projects completed are remarkably well documented. The typical report relies heavily on graphic presentation to tell the story. It is the rule, not the exception, for these reports to show:

- Sketches of the product under study.
- The flow diagram of the process.
- The Pareto analysis identifying the vital few troubles.
- The Ishikawa Cause and Effect Diagram mapping out the variables which might be causing the trouble.

- Histograms, frequency tables, control charts and other statistical analyses of data.
- Charts showing the reductions in defects resulting from the project.
- A computation of the Yen of cost improvement. In companies with a firm history of use of QC Circles, the collective results have begun to show up in the company planning and budgeting as something substantial and predictable – a form of budgeted cost reduction.

The Role of the Hierarchy

While participation in the QC Circles is voluntary, the existence of such Circles raises practical questions of how to coordinate the work of the Circles with that of the hierarchy. When the company is large, and the QC Circles number in the hundreds, this coordination can become complex, since the grain of the two structures runs in different directions. To date, the experience gained has already identified some helpful principles of coordination. One of these is a dual approach to selection of projects. Projects for the QC Circles are proposed in two ways:

1. By the Circle itself, based on its job knowledge plus the collective creativity of the members.
2. By the management hierarchy. For example, the company goal may be to cut rejects from 5 percent to 2 percent. Breaking this goal down into sub-objectives can result in projects for QC Circles.

From the nature of things, the first projects taken on by a QC Circle are those of control – improved control of the local process, reduction of operator controllable defects. As a firmer grip is secured on these control problems, more elaborate projects are chosen, involving breakthrough into new levels of performance. Here the Circle finds itself conducting more sophisticated analyses, setting up experiments and otherwise walking boldly into the unknown.

As these more elaborate projects are tackled, the QC Circle may find itself faced with causes and influences which are outside of its own department. Commonly such matters are beyond the scope of the Circle, which is necessarily limited to intra-departmental problems. Except for the Gemba-cho, the members of the Circle are limited in their knowledge of, and access to, the happenings in other departments. For example, Kanto Auto-Works Company has found it useful to set up a two-way feedback of findings of the QC Circles and of the field service mechanics, to promote the Circle leader's quality and cost consciousness, and to provide special guidance in pre-delivery inspection and maintenance work. Such communications can be made only through the hierarchy.

When problems of an inter-departmental nature are encountered, the approach is to broaden the communication through a QC Circle leaders' meeting or a QC Circle joint meeting. If a project of an interdepartmental nature needs to be taken on, it is assigned to a QC Team. The QC Team is quite different from the QC Circle, as is seen in the following comparison:

Aspect	The QC Circle	The QC Team
Creation	Voluntary	By management order; hierarchical
Identification of projects	Mostly by the Circle	Mostly through management planning
Scope of activities	Intra-departmental	Inter-departmental
Membership	Gemba-cho and his non-supervisors	Gemba-cho and supervisors and engineers
Life	Can be continuous, for project after project	For this project only

An added problem facing the hierarchy is that of providing the training facilities, the budgets, the support for aiding the Circles in their work, the follow through to make remedies effective, and the means for giving recognition. In a large company like Nippon Kokan K.K., or Kobe Steel (which has about 1000 QC Circles), this requires positive organization machinery. To date, the companies have gladly paid the price, since the return on investment has been eminently satisfactory.

There is also evidence to suggest that the QC Circle concept may be broadened considerably, in two respects.

1. To deal with non-quality problems as well as with quality problems, i.e., a universal way of using non-supervisors for projects of all sorts – for improvements in cost, safety, productivity, etc. Some of this has happened. Matsushita's "QC" Circles are in fact involved with some non-QC matters. Even the company chauffeurs have a QC Circle. However, for the QC Circle movement to broaden out into an all-purpose movement will require, as a pre-requisite, that additional tool kits be developed, one for each area of subject matter. The success of the Circle movement as applied to quality control has, to an important degree, been due to the existence of a kit of tools which simplify greatly the attack on quality problems. Some of the tools in this kit, e.g., the Pareto principle, are universals – they are helpful in solving any problem. However, as applied to other subject matter, the kit is incomplete, and would need to be supplemented.
2. As a leading device for strengthening relations between the company and the employee body. During my April 1966 seminars in Japan, several company directors made this

point. In Nippon Kayaku K.K., the managers stimulated a QC Circle movement as part of a defensive program to prevent leadership of the work force from being taken over by radical agitators. The resulting QC Circles played a significant role as part of a total program of "turning around" the performance of a sick plant.

The Motivational Base

To a Westerner, the most astonishing aspect of the QC Circles has nothing to do with quality control. What is astonishing is the degree to which the Japanese have succeeded in harnessing the energy, ingenuity and enthusiasm of the work force to the unsolved problems of the company. In the West, (on both sides of Churchill's "Iron Curtain") it is difficult enough to do this during working hours. The Japanese have gone beyond this – they have done it outside of working hours as well. It is of the utmost importance to understand *how* it is that the Japanese have been able to bring this off.

First of all, it must be recognized that the Japanese manager has, for the most part, retained the leadership of the work force, and has not lost it to the Union, the politician, or the intellectual. In Japan, the usual, traditional relationship of companies to employees has been one of lifelong employment, with the company voluntarily assuming important social responsibilities: sick benefits, unemployment benefits, old age benefits, etc. In the non-Communist West, the tradition has been otherwise. Companies generally did not voluntarily provide these benefits. (Even those which did usually did it badly – they were guilty of "paternalism.") In consequence, the work force was driven to find elsewhere the solutions to the problems of unemployment, sickness, old age. New leadership sprang up to propose collective solutions, and the political power of the many made these proposals effective over the resistance of the managers. In the process, the leadership of the men passed from the managers to someone else, and still rests there. The Western manager may look askance at the high fringe benefit percentages of Japanese companies (as do some Japanese managers). But the Western company has paid the price both ways – it is taxed to pay the benefits, and has lost the leadership to boot. To regain this leadership is a long journey, and the present generation of managers will not make it (in my opinion).

Secondly, the Japanese concept of organization of work differs markedly from that followed in the West, especially that followed in the United States. American companies, under the Taylor influence, have gone far down the road of separating manufacturing planning from execution. The engineers play the dominant, if not the exclusive, role in planning, leaving to the production supervision the execution of the plan. The Western European countries tend to give the top managers the main role in the planning, really a dual role of directing and engineering. However, the Japanese evolution resulted in less formal planning, either by the engineers or the top managers. There remained a considerable residue of planning to be done by someone else, i.e., the production supervision. This evolution has, of course, enlarged the responsibility of the Gemba-cho. In turn, the carrying out of these broader responsibilities has broadened the skills and effectiveness of the Gemba-cho. (We have some of this in America in some job shops and in some service departments where there has been no tradition of extensive use of engineers for planning.)

Finally, the priority of industrial motivational incentives in the Japanese culture is quite different from that prevailing in the West. However illogical this priority may seem to the Westerner, it is very logical to the Japanese. As well as I was able to determine, here is the order of importance:

1. *Improving the company's performance.* Under a tradition of lifetime association with one company, and with enlightened company practices as to employee welfare problems, the employee has a stake in the company's health, and responds to opportunities to do something about it. This loyalty to the company is evidently not limited to the company as an abstraction. There are loyalties to the particular shop and to the local work group which can contribute further to the overall relationship between the company and the work force.
2. *Self-improvement.* The Japanese zeal for learning and for doing attaches itself to opportunities for training and for creativity. This self-improvement is also one of the tools for by-passing seniority as the basis for promotion.
3. *Recognition.* The QC Circle movement has enlarged the social standing of the Gemba-cho, who previously had not participated fully in social recognition. Opportunities now exist for the Gemba-cho to get out to conferences, to visit other companies, and even to become a member of a team to go abroad to study foreign practice. The journal GEMBA TO QC is itself a recognition of a status of importance. Collectively it all adds up to quite a rise in social stature.
4. *Creativity amid boredom.* Particularly among non-supervisors, and to a degree among all who work on the factory floor, the day-to-day job can be monotonous and boresome to an oppressive degree. If essential human needs (ego needs, social needs creativity, self-fulfillment) are not met on the job the employee must find them elsewhere – in his hobbies, in sports, in non-company associations. By providing a group opportunity for creativity with respect to the job (though out of regular hours) the company has provided a new opportunity to neutralize the problems of boredom and monotony.
5. *Money incentives.* It may come as a surprise to a Westerner that this incentive (for joining a QC Circle) has the lowest priority. Yet such seems to be the case. There is wide variation in practice so far as paying for time spent is concerned. Some companies make no payment at all. At Kobe Steel Company, one hour a month is paid for- the rest is not. The Matsushita girls were paid at rates equal to half of their regular pay (not time and one-half) plus tea and cake. Some companies pay at full time rates for the out-of-hours work of the QC Circles. The above relates to payment for *time* spent out-of-hours. In the case of *results* achieved, there is no payment as a direct consequence of such results. There is however, an indirect effect. The results of a successful project improve the company's profit, and thereby the employee bonuses which are commonly geared to company profits by one formula for all employees.

As it happens, Matsushita has recently conducted a morale survey among QC Circle members. All workers mentioned the benefit of learning through the studies. In addition, they pointed out the following advantages:

1. By attending the QC Circle meetings, they acquired the ability to speak in public.
2. They made more friends and this contributed to a more cheerful atmosphere in the workshop.
3. They became more conscious of the importance of their jobs and their responsibility, and through the awareness of this importance, now have more pride in their jobs.
4. They improved their personality and acquired the ability to concentrate on solution of problems. These experiences with the QC Circle they apply in their home life.

Comparison with other Motivational Programs

Inevitably the QC Circle concept must be compared with other motivational forms. What is different about it? In what respects is it limited in application to the Japanese culture, and in what respects is it based on universals?

To make this comparison we might look at a wide assortment of motivational schemes as practiced in the West: the long-standing systems of piece work; the familiar suggestion systems in force in many companies; the system of Stakhanovism and its derivatives as practiced in Eastern Europe; the Scanlon plan of joint committees for improving productivity; and, because of current interest, the Zero Defects (ZD) family of programs.

We may look at these various plans from a number of standpoints:

1. *Voluntary or compulsory?* Joining the QC Circle is voluntary, and this characterizes most motivational schemes. Piece work is an exception. So also is the "voluntary" signing of ZD pledge cards which can hardly be considered voluntary, though most of the rest of the ZD activity is left to voluntary action.
2. *Out-of-hours or on the job?* Here the out-of-hours QC Circle is virtually unique. This feature may be unique to Japan as well. In Western countries it is common for employees to take training courses on "their own time." However, in no Western country known to me would there be any significant response by the work force to studying projects on their own time, unless this were negotiated through the Unions, and paid for at acceptable rates of pay. In the Eastern European countries there may be some of this, but I am not clear on this aspect of their practice.
3. *Premises as to need for analysis.* The QC Circle concept starts with the assumption that the causes of poor quality performance are not known, and that there is need for analysis to discover what actually causes the poor performance. Except for the Scanlon plan, the other programs largely assume, as an axiomatic belief, that the work force could do better but is holding back for no good reason. While in all companies there are instances which can support this assumption, on a broad basis, the assumption is defective, and is misleading to many, many managers and companies all over the

world.

4. *Need for prior training in use of the tools of analysis.* The QC Circle concept is unique in accepting this need. This is, of course, consistent with the belief that the causes of poor performance are not really known. Other motivational systems, founded mainly on the prior assumption that the work force "can but won't," see no need for training in how to analyze, i.e., what is there to analyze if we know the causes at the outset? It is a tribute to the Japanese that they have recognized this need for prior training.

Elements of the plan	As practiced in	
	Conventional motivational plans	QC Circles
Choice of projects	Left up to employee to identify his own project	Some projects identified by management; others identified by the QC Circle
Training in how to analyze provided a project	None provided	Formal training program Out-of-hours; voluntary
Analysis of the project	By employee himself or with such aid as he can muster; otherwise, by formal suggestion which is analyzed by someone else	Analysis is by the QC Circle, out-of-hours, using training tools previously provided
Payment for time spent	None	Varies from no pay to full pay for hours spent
Payment for successful idea	Definite payment varying with value of idea	No payment. Indirect effect on company profit and resulting bonus which uses one formula for all employees
Non-financial incentives	Opportunity of creativity and recognition; pride of workmanship	Opportunity for training; opportunity for creativity and recognition; membership in a group; response to company leadership

5. *Group or individual analysis?* The QC Circle is designed for group study. Except for the Scanlon plan, the rest all look to individuals for contribution.

6. *Identification of projects.* The QC Circle concept provides for projects to be proposed by the company hierarchy as well as by the QC Circle itself. Again except for the Scanlon plan, other motivational plans look mainly to the individual to identify "his own" project.
7. *Conduct of the analysis.* The QC Circle conducts its own analysis, though with access to the hierarchy if needed. To a degree, all systems provide for self-analysis, but for the most part the analysis, if any, is left for someone else, e.g., a suggestion blank is filled out and dropped into a box. Here again, the prior training has served a vital purpose, by making the QC Circle largely self-sufficient as to analysis.
8. *The reward.* The QC Circle emphasis is mostly on non-financial rewards, featuring improvement (company improvement, self-improvement) as a goal in its own right. The system of Stakhanovism also has this feature, though emphasizing the abstraction of Communism, or its derivative of "building a better Socialist world." The ZD schemes stress pride of workmanship. The piece work and the suggestion systems rely on money incentives, the amount being related to the value of the work or the suggestion.
9. *Follow through to make changes effective and set up controls.* Here the QC Circles play a larger role than is found in other motivational systems, again because of being trained in how to play this role.

It is evident that the QC Circle is different enough to be regarded as a new industrial form. The Scanlon plans have some of the features, but are not really based on the work force – they involve joint committees of managers, Union officials and the work force. (Union officials are debarred from membership in the QC Circles.)

The table above summarizes the foregoing comparison as applied to creative projects.

More than Motivation

Of the utmost importance is the fact that, through the QC Circles, the Japanese have made a clean break with a tired, outworn theory which plagues the West. This is the theory that the company's quality troubles are due to operator indifference, blunder and even sabotage. Under this theory, the operators could solve the company's quality problems if only the right motivational lever could be found and thrown.

The QC Circle concept starts with a different set of beliefs:

- we don't really know the cause of our quality troubles; we don't even know which are the main troubles. Hence,
- we must teach people *how* to analyze the trouble pattern to identify the main troubles. Also,
- we must teach people how to list the suspected causes of the main troubles, and how to

- discover which are the real causes. Then
- we must help people to secure remedies for these real causes. Finally,
- we must teach people how to hold the gains through modern control

All this is in refreshing contrast to the painted, noisy spectacles which characterize all too many of our motivational programs.⁽³⁾ The speeches are made, the posters go up, the pledge cards are signed, the hot potato is thrown into the lap of the operators. Yet, except as a show for customer relations, what good is it if the basic assumptions are defective? Have these assumptions been checked? Are the main troubles really operator-controllable? Can the operators, by themselves, discover what to do differently from what they have been doing? If these assumptions are not sound, the structure built on them cannot be sound either.

Conclusion

The QC Circle movement, standing by itself, must be characterized as a brilliant achievement – a *tour de force* in management leadership. Nowhere else have I seen industrial companies succeed in so constructively harnessing the interest, the time and the ingenuity of the work force to the myriad's of intradepartmental problems – not only problems of control, but problems of breakthrough as well.

Whether the QC Circle concept can be adapted to other cultures is at present open to serious doubt. At the June 1966 Conference of the European Organization for Quality Control (in Stockholm, Sweden), I related the QC Circle story from the lecture platform. It turned out to be the high point of the conference. The questions from the audience re-quired that a special, added session be set up, devoted solely to the QC Circle story. At this special session, and in the corridor discussions thereafter, it became evident that no one envisioned readily how to make the QC Circle concept effective in any other culture. It is amazing that such should be the universal reaction.

Finally, it is well to note the broader setting of which the QC Circles are a part. That broader setting is the revolution which the Japanese have created in their approach to quality. Here I venture to publish, for the first time, the prediction I have made in my 1966 lectures (in America, Japan, Sweden and Yugoslavia).

This prediction is based on seeing, at first hand, the trend of events in Japan and in a good many other countries over the last two decades. During those decades the Japanese, through a revolution in quality control practices, have already attained a world competitive position, though starting with the worst quality reputation among the industrial nations. Now there is evidence that the energy which created this revolution, far from being spent, is still in full vigor.

In my observation, no other nation is so completely unified on the importance of good quality achievement, so eager to discover and adopt the best practices being followed in other countries, so avid in training all company levels and functions in modern methods of controlling quality, so vigilant in regulating the quality of exported goods. To be sure there is progress along these fronts in all countries, but nowhere else is there the broad-based

sense of devotion and especially, the *sense of urgency* which is so evident among the Japanese. Witnessing their accelerated pace, and comparing this with the pedestrian progress of other countries, the conclusion is inescapable:

The Japanese are headed for world quality leadership, and will attain it in the next two decades, because no one else is moving there at the same pace.

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