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The Quality Trilogy

A Universal Approach to Managing for Quality

By J.M. Juran

Several premises have led me to conclude that our companies need to chart a new direction in managing for quality. These premises are as follows.

1. There is a crisis in quality. The most obvious outward evidence is the loss of sales to foreign competition in quality and the huge costs of poor quality.

2. The crisis will not go away in the foreseeable future. Competition in quality will go on and on. So will the impact of poor quality on society. In the industrialized countries, society lives behind protective quality dikes.

3. Our traditional ways are not adequate to deal with the quality crisis. In a sense, our adherence to those traditional ways has helped to create the crisis.

4. To deal with the crisis requires some major breaks with tradition. A new course must be charted.

5. Charting a new course requires that we create a universal way of thinking about quality — a way applicable to all functions and to all levels in the hierarchy, from the chief executive officer to the worker in the office or the factory.

6. Charting a new course also requires extensive personal leadership and participation by upper managers.

7. An obstacle to participation by upper managers is their limited experience and training in managing for quality. They have extensive experience in management of business and finance but not in managing for quality.

8. An essential element in meeting the quality crisis is to arm upper managers with experience and training in how to manage for quality, and to do so on a time scale compatible with the prevailing sense of urgency.

9. Charting a new course also requires that we design a basis for management of quality that can readily be implanted into the company's strategic business planning, and that has minimal risk of rejection by the company's immune system.

A company that wants to chart a new course in managing for quality obviously should create an all-pervasive unity so that everyone will know which is the new direction, and will be stimulated to go there. Creating such unity requires dealing with some powerful forces, which resist a unified approach. These forces are for the most

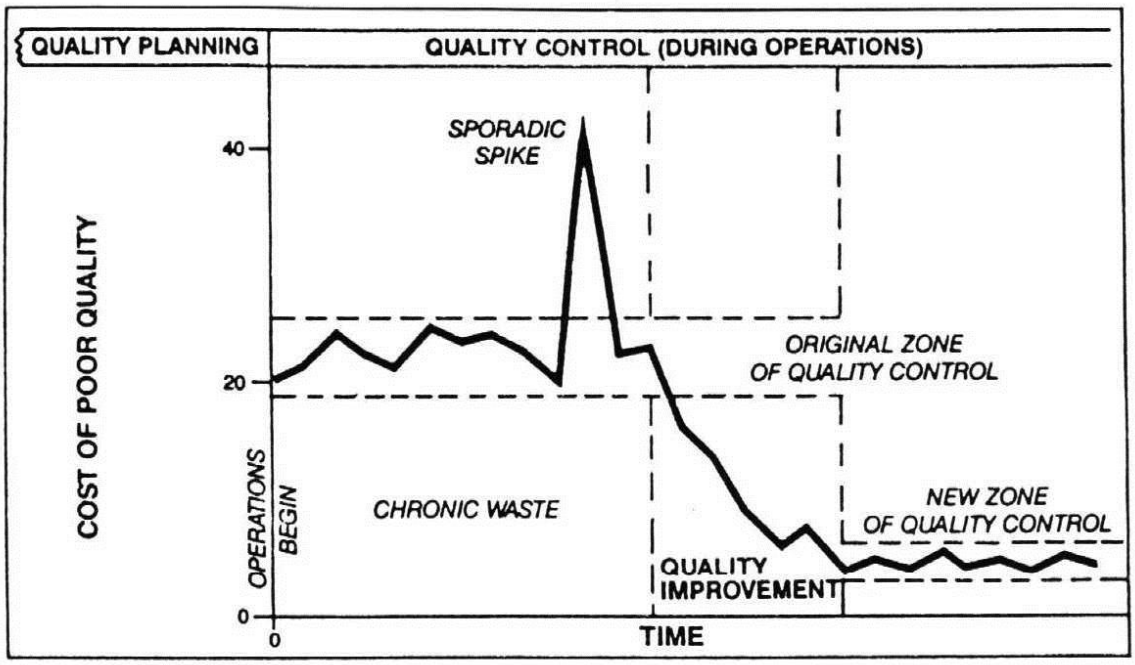


Figure 1. The Quality Trilogy

part due to certain non-uniformities inherent in any company. These non-uniformities include:

- The multiple functions in the company: product development, manufacture, office operations, etc. Each regards its function as something unique and special.

- The multiple levels in the company hierarchy, from the chief executive officer to the non-supervisory worker, These levels differ with respect to responsibility, prerequisite experience and training, etc.

- The multiple product lines: large and complex systems, mass production, regulated products, etc. These product lines differ in their markets, technology, restraints, etc.

Such inherent non-uniformities and the associated beliefs in uniqueness are a reality in any company, and they constitute a serious obstacle to unity of direction. Such an obstacle can be overcome if we are able to find a universal thought process — a universal way of thinking about quality — which fits all functions, all levels, and all product lines. That brings me to the concept of the "quality trilogy."

(Let me add parenthetically that my colleagues in Juran Institute have urged me to let them call it the "Juran Trilogy." Their reasons are purely mercenary. I have yielded to their wishes. In Juran Institute we also need unity.)

The underlying concept of the quality trilogy is that managing for quality consists of three basic quality-oriented processes.

- Quality planning.
- Quality control.
- Quality improvement.

Each of these processes is universal; it is carried out by an unvarying sequence of

activities. (A brief description of each of these sequences appears in the box on p. 4.) Furthermore, these universal processes are interrelated in ways we can depict on a simple diagram. (See Figure 1.)

The starting point is quality planning — creating a process that will be able to meet established goals and do so under operating conditions. The subject matter of the planning can be anything: an office process for producing documents; an engineering process for designing products; a factory process for producing goods; a service process for responding to customers' requests.

Following the planning, the process is turned over to the operating forces. Their responsibility is to run the process at optimal effectiveness. Due to deficiencies in the original planning, the process runs at a high level of chronic waste. That waste has been planned into the process, in the sense that the planning process failed to plan it out. Because the waste is inherent in the process, the operating forces are unable to get rid of the chronic waste. What they do instead is to carry out "quality control" — keep the waste from getting worse. If it does get worse (sporadic spike), a fire fighting team is brought in to determine the cause or causes of this abnormal variation. Once the cause(s) has been determined, and corrective action is taken, the process again falls into the zone defined by the "quality control'' limits.

Figure 1 also shows that in due course the chronic waste falls to a much lower level. Such a reduction does not happen of its own accord. It results from purposeful action taken by upper management to introduce a new managerial process into the system of managers' responsibilities — the quality improvement process. This quality improvement process is superimposed on the quality control process — a process implemented in addition to quality control, not instead of it.

Figure 2.

Quality and Finance: Parallels

Trilogy Processes
- Quality Planning
- Quality Control
- Quality Improvement

Financial Processes
- Budgeting
- Cost Control, Expense Control
- Cost Reduction, Profit Improvement

We can now elaborate the trilogy descriptions somewhat as follows.

Process: Quality planning — the process for preparing to meet quality goals.

End result: A process capable of meeting quality goals under operating conditions.

Process: Quality control — the process for meeting quality goals during operations.

End result: Conduct of operations in accordance with the quality plan.

Process: Quality improvement — the process for breaking through to unprecedented levels of performance.

End result: Conduct of operations at levels of quality distinctly superior to planned performance.

The trilogy is not entirely "new". If we look sideways at how we manage finance, we notice some interesting parallels, as shown in Figure 2. (I have often used the financial parallels to help explain the trilogy to upper managers. It does help.)

In recent seminars, I have been collecting upper managers' conclusions on their companies' performance relative to the basic processes of the trilogy. The results are quite similar from one seminar to another, and they can be summarized as shown in Figure 3.

These summarized data point to several conclusions.

1. The managers are not happy with their performance relative to quality planning.

2. The managers rate their companies well with respect to quality control, i.e., meeting the established goals. Note that since these goals have traditionally been based mainly on past performance, the effect is mainly to perpetuate past performance — the very performance that is at the root of the quality crisis.

3. The managers are decidedly unhappy with their performance relative to quality improvement.

My own observations of company performance (during consultations) strongly confirm the above self-assessment by company managers. During my visits to companies I have

Basic Quality Processes

Quality Planning:

Identify the customers1 both external and internal.

Determine customer needs.

Develop product features that respond to customer needs. (Products include both goods and services.)

Establish quality goals that meet the needs of customers and suppliers alike, and do so at a minimum combined cost.

Develop a process that can produce the needed product features.

Prove process capability—prove that the process can meet the quality goals under operating conditions.

Control:

Choose control subjects — what to control.

Choose units of measurement.

Establish measurement.

Establish standards of performance.

Measure actual performance.

Interpret the difference (actual versus standard).

Take action on the difference.

Improvement:

Prove the need for improvement.

Identify specific projects for improvement.

Organize to guide the projects.

Organize for diagnosis—for discovery of causes.

Diagnose to find the causes.

Provide remedies.

Prove that the remedies are effective under operating conditions.

Provide for control to hold the gains.

found a recurring pattern of priorities and assets devoted to the processes within the trilogy. This pattern is shown in Figure 4.

Figure 3.

Quality Process Performance

(Upper managers' ratings of their companies' performance)

Trilogy processes	Good	Passing	Not passing
Quality planning	13%	40%	47%
Quality control	44	36	20
Quality improvement	6	39	55

As Figure 4 shows, the prevailing priorities are not consistent with the managers' self-assessment of their own effectiveness. That assessment would suggest that they should put the control process on hold while increasing the emphasis on quality planning and especially on quality improvement.

To elaborate on the need for raising the priority on quality improvement, let me present several baffling case examples.

1. Several years ago the executive vice president of a large multinational rubber company made a round-the-world-trip with his chairman. They made the trip in order to visit their major subsidiaries with a view to securing inputs for strategic business planning. They found much similarity with respect to productivity, quality, etc., except for Japan. The Japanese company was outperforming all others, and by a wide margin. Yet the Americans were completely mystified as to why. The Americans had toured the Japanese plant, and to the Americans' eyes the Japanese were using the same materials, equipment, processes, etc., as everyone else. After much discussion the reason emerged: The Japanese had been carrying out many, many quality improvement projects year after year. Through the resulting improvements they made more and better products from the same facilities. The key point relative to "ignorance" is that the Americans did not know what to look for.

2. A foundry that made aluminum castings had an identical experience. The foundry was losing share of market to a Japanese competitor, mainly for quality reasons. Arrangements were made for a delegation of Americans to visit the Japanese factory. The delegation came away completely mystified. The Japanese were using the same types of equipment and processes as were used by the Americans. Yet the Japanese results in quality and productivity were clearly superior. To this day the Americans don't know why.

3. A few years ago I conducted research into the yields of the processes that make large-scale integrated circuits. To assure comparability, I concentrated on a single product type — the 16K random access memory (16K RAM). I found that Japanese yields were two to three times the Western yields despite similarity in the basic processes. It came as no surprise to me that the Japanese have since become dominant in the market for 64K RAM and up.

4. My final example relates to the steel industry. The managers of American steel companies report that their cost of

poor quality (just for factory processes) runs at about 10-15% of sales. Some of these steel companies have business connections with Japanese steel companies, and the respective managers exchange visits. During these visits the Americans learn that in Japanese steel mills, which use comparable equipment and processes, the cost of poor quality runs at about 1-2% of sales. Again the American managers don't know why. Some of them don't even believe the Japanese figures.

Figure 4.

Priorities for Quality Processes

Trilogy processes	Self-assessment by upper managers	Prevailing priorities
Quality planning	Weak	Limited priority
Quality control	Very strong	Top priority, by a wide margin
Quality improvement	Very weak	Very low priority

My own explanation is that the Japanese, since the early 1950s, have undertaken to improve quality at a pace far greater than that of the West. The slopes of those two lines (Figure 5) are an index of the rate of improvement. That rate is in turn dependent on the number of quality improvement projects completed. (A project is a problem scheduled for solution.) My estimate is that in terms of numbers of improvement projects completed, the Japanese pace has been exceeding that of the West by an order of magnitude, year after year.

It seems clear that we must change our priorities with regard to the three quality processes. This change in priorities represents a new course. Underlying this new course is the quality trilogy. As a universal way of thinking about quality, the trilogy offers a unified approach for multiple purposes. Let us look at two of these purposes: training in managing for quality, and strategic quality planning.

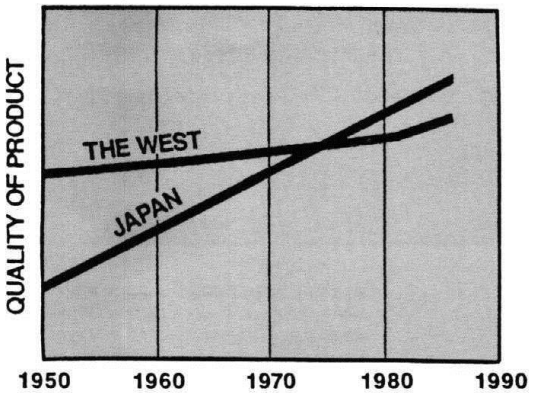
With respect to training, many of our companies have decided to break with tradition. In the past, their training in managing for quality has been limited to managers and engineers in the quality department. The break with tradition is to extend such training to all functions. Since this is a sizeable undertaking, the companies have set up corporate task forces to plan the approach.

These task forces have run into serious obstacles due to those same systems of variables mentioned earlier. It is hopeless to establish numerous training courses in managing for quality, each specially designed to fit specific functions, specific levels in the hierarchy, specific product lines, etc. Instead, the need is for a universal training course that will apply to all audiences, but with provision for plugging in special case examples as warranted. The trilogy concept meets that need.

The training courses then consist of fleshing out the three sequences of steps described in the box on page 4. Those sequences have been field tested and

proven to be applicable to all functions, levels, and product lines.

Figure 5
World Competition in Quality



We have already seen that the trilogy parallels our approach to strategic business planning. Our companies are experienced in business planning; they are familiar and comfortable with the concepts of financial budgets, cost control, and cost reduction. We can take advantage of all that experience by grafting the quality trilogy onto the existing business planning structure. Such a graft reduces the risk that the implant will be rejected by the company's immune system.

The usual starting point is to set up a quality planning council to formulate and coordinate the activity companywide. The council membership consists of high-ranking managers — corporate officers. The chairman is usually the chief executive officer or an executive vice president. The functions of this council parallel closely the functions of the company's finance committee, but apply to quality instead of finance.

The council prepares a written list of its responsibilities. These typically involve the following:

- Establish corporate quality policies.
- Establish corporate quality goals; review quality goals of divisions and major functions.
- Establish corporate quality plans; review divisional and functional plans.
- Provide the infrastructure and resources needed to carry out the plans.
- Review quality performance against plans and goals.
- Revise the managerial merit rating system to reflect performance against quality goals.

It is all quite logical, and some companies are already securing gratifying benefits from going into strategic quality planning. However, other companies are failing to get results, and the main reasons for these failures are becoming evident. They relate to some areas which I will now discuss: goal setting; providing the infrastructure; providing resources; upper management leadership.

Setting goals. Goal setting has traditionally been heavily based on past performance. This practice has tended to perpetuate the sins of the past. Failure-prone designs were carried over into new models. Wasteful processes were not challenged if managers had met the budgets — budgets that had, in turn, assumed that the wastes were a fate to be endured.

All this must change. Goals for parameters that affect external customers must be based on meeting competition in the marketplace. Goals for parameters that affect internal customers must be based on getting rid of the traditional wastes.

Infrastructure. Strategic quality planning requires an infrastructure to be set up. The nature of this is evident when we look sideways at the infrastructure needed for strategic business planning: a budgetary process; an accounting system to evaluate performance; associated procedures, audits, etc.

Much of this structure has long been in place to serve various local needs: divisions, functions, factories, etc. This structure must now be supplemented to enable it to meet strategic quality needs as well. This is especially the case in large corporations, which traditionally have delegated matters of quality to the autonomous divisions. The quality crisis has caused some large corporations to revise this delegation. They now require corporate review of divisional quality goals, plans, and reports of performance. The new approach has required revision of the infrastructure.

Resources. It takes resources to carry out plans and meet goals. To date, companies have exhibited a selective response to this need. Let us look at several areas that require such resources.

- Training. Here the response of companies has generally been positive. Companies have invested heavily in training programs for special areas such as quality awareness, statistical process control, and QC circles. To go into strategic quality planning will require extensive training in the trilogy — how to think about quality. One can hope the response will continue to be positive.

- Measurement of quality. The quality crisis has required a major change in the basis for goal setting — the new basis requires measurement of market quality on an unprecedented scale. For example, some companies now have a policy that new products may not go on the market unless their reliability is at least equal to that of leading competitive products. Such a policy cannot be made effective unless resources are provided to evaluate the reliability of competing products.

Beyond the need to expand quality-oriented marketing research, there are other aspects of measurement which require resources: establishing the scorekeeping associated with strategic quality planning (the quality equivalent of the financial profit statements, balance sheets, etc.); extending measures of quality to the non-manufacturing processes; and establishing means for evaluating the quality performance of managers, and fitting these evaluations into the merit rating system.

- Quality improvement. Here we have some puzzling contradictions. An emerging database tells us that quality improvement projects provide a higher return on investment than virtually any other investment activity. Yet many companies have not provided the needed resources.

To be specific, that database comes mainly from the companies that have presented papers at the annual IMPRO conferences — conferences on quality improvement. Those published papers and related unpublished information indicate that in large organizations — sales of $1 billion or more — the average quality improvement project yields about $100,000 of cost reduction.[1]

The same database indicates that to complete a project requires from $5,000 to $20,000 in resources. These resources are needed to diagnose the cause of the problem and to provide the remedy. The return on investment is obviously attractive. Nevertheless, many companies — too many — have failed to provide the resources and hence have failed to get the results.

To go into strategic quality planning will require companies to create, for the quality function, a new role — a role similar to that of the financial controller. In all likelihood this new role will be assigned to the quality managers.

In part this new role will involve assisting the company managers to prepare the strategic quality goals — the quality equivalent of the financial budget. In addition the new role will involve establishing the continuing means of reporting performance against quality goals. This role parallels the financial reporting role of the financial controller.

Collateral with those two new responsibilities will be others, also of a broad business nature.

- Evaluation of competitive quality and of trends in the marketplace.

- Design and introduction of needed revisions in the trilogy of processes: quality planning, quality control, and quality improvement.

- Conduct of training to assist company personnel in carrying out the necessary changes.

For many quality managers such a new role will involve a considerable shift in emphasis: from technology to business management; from quality control and assurance to strategic quality planning. But such is the wave of the future. Those quality managers who choose to accept that responsibility, if and when it comes, can look forward to the experience of a lifetime. They will be participating fully in what will become the most important quality development of the century.

About the Author

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[1] Eighteen case examples are cited in "Charting the Course," The Juran Report, Number 4 (Winter 1985).