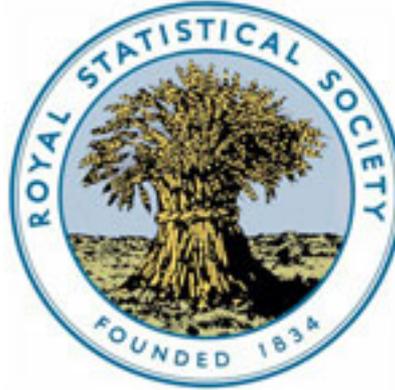




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Deming's 14 points for management: framework for success

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Abstract. Dr W. Edwards Deming modestly describes himself as a 'consultant in statistical studies'. Others have called him the father of the third wave of the Industrial Revolution. It is now becoming widely accepted that the dramatic turnaround in Japan's industrial fortunes dates from Dr Deming's visit, at the invitation of JUSE, in mid-1950. His philosophy combines widespread use of statistical ideas and methods throughout organisations with an approach to management which is, in most part, diametrically opposed to traditional and current practice in the Western world. The management approach creates an environment where the importance of statistical practice is recognised to an otherwise unprecedented extent. This approach is not normally taught in management and business schools, and so the statistical consultant, needs to become familiar with, and to encourage the adoption of, the management philosophy as much as the statistical aspects. In this paper, a summary of Dr Deming's crucial 14 Points for Management is presented, abstracted and adapted from a number of versions which have appeared over the years.

Introduction

William Edwards Deming was born in Sioux City in the state of Iowa on 14 October 1900. He must be one of the busiest 87-year-olds around—certainly the busiest 87-year-old statistical consultant! Indeed in this his ninth decade he is attracting greater audiences and having a more substantial direct effect on the Western world, including especially his home country of America, than he has ever previously achieved. It is highly unfortunate for all of us in this part of the world that it has taken so long; for others have been listening to him for a long, long while and have reaped incalculable rewards as the consequence. Only in the 1980s is it becoming widely realised that Dr W. Edwards Deming has been having a profound influence on the industrial history of the world for more than the last third of a century. Had he been listened to earlier, then that history could have turned out very differently. William E. Conway, who in 1979 appears to have been the first leading American businessman to realise the importance of Deming's work, refers to him as no less than 'the Father of the Third Wave of the Industrial Revolution'. Even those of you who have not heard of Deming before today will not take long to guess which is the country that has been listening to him, and implementing his methods, the longest—since as long ago as 1950. It is, of course, Japan. Industrialists and others have been searching for the 'Japanese secret' for some years now. Light is beginning to dawn: the Japanese secret is, of all things, an American statistician to whom the Americans would not listen.

Let me run through a very brief history of this remarkable man. He obtained his doctorate at Yale in mathematical physics in 1928, at which time he joined the United States Department of Agriculture as a mathematical physicist, remaining in that position until 1939. As you will all be aware, a lot happened in statistics during those 11 years—not least as regards agricultural applications. So it is not surprising that Deming's interest in probability and statistics, which he had already met during his time at Yale, flourished; and in 1936 he came to London to study under Fisher at University College. But, in spite of his keen interest in the mainstream developments of mathematical statistics at this time, he found even greater inspiration in the work of

Walter Shewhart, the originator of the concepts of statistical control of processes and of the related technical tool of the control chart. The ideas of statistical control, as presented by Shewhart, are of course not wholly distinct from the better-known developments in experimental design of the time, in that Shewhart analysis of manufacturing processes was also concerned with splitting variation into components. But his components of variation were of a very particular kind—those due to what he called assignable and unassignable causes, and which Deming calls special and common causes respectively. The crucial relevance of this kind of analysis of processes to their reliability, consistency and stability and to any serious quality-improvement efforts is one of the things that Western industry is learning rather late in the day. A fundamental advance made by Deming in the 1930s was the realisation that this kind of analysis is just as appropriate and vital to many non-manufacturing processes and systems: to administration, marketing, sales, service operations, training, and many others.

I shall not go any further into these statistical aspects of Deming's work. Virtually all of the rest of this presentation needs to be spent on what Deming rightly regards as of even greater importance, and on which he concentrates increasingly as the years go by—and that is his philosophy of management. But let me finish the short history first. In 1939 he was invited into the Bureau of the Census as Head Mathematician and Advisor in Sampling. Due to his influence and training in the use of sampling methods and statistical control, many of the processes in the 1940 Census experienced something like a six-fold productivity increase compared with previously, several hundreds of thousands of dollars were saved, and the census results were published much sooner than usual. During the time of American involvement in World War II, Deming was involved in statistical quality control training of large numbers of people involved in the war effort. This programme had an enormously beneficial effect on the quality and volume of what was being produced, with spectacular reductions in scrap and rework.

After the war, Deming played a leading role in the formation of the ASQC. But as far as industry was concerned, American manufacturers found ready post-war markets for virtually anything they produced, and the wartime life-or-death urgency for improving quality all but disappeared in favour of sales and other areas more closely concerned with short-term profits. Tragically, as you will well realise, this situation still sounds pretty familiar 40 years later.

Deming first visited Japan in 1946 under the auspices of the Economic and Scientific Section of the US Department of War, and returned there in 1948. Late in 1949 he was invited back to teach statistical methods for industry by Ken-ichi Koyanagi, head of the Union of Japanese Scientists and Engineers. He went in June 1950. He lectured to vast numbers of students—and to top industrialists. They listened, they learned, they 'absorbed' (as Dr Deming has said) his ideas. And they put them into practice. The rest, as they say, is history.

So what went wrong in America? Why, after such a promising start, did Deming find his message falling on deaf industrial ears? He freely admits his mistake. He concentrated his attention on the engineers, the administrators, the shop-floor—the 'people who did the work'. He did not spend enough time with management, particularly senior management. Perhaps he presumed that the value of what he was doing would be obvious to the people at the top. Not so. I guess many people here have made the same kind of mistake—I know I have. So, when Deming went to Japan, he did not only talk about statistics: he also talked about management. He talked about the environment that management must create in order that real progress can be made. He talked of the philosophy of a continual, relentless, perpetual search for improvement, not only in end-products or services, but in all aspects and all sections of an organisation's work and activities, i.e. *total quality control*. He talked of the vital

necessity of teamwork: teamwork between managers and the people for whom they are responsible, teamwork between the different sections and departments within the organisation, teamwork between an organisation and its suppliers. He talked of the necessity of learning what one's customers really want and need; to quote him: "the customer is the most important part of the production line". And he talked of *people*. "An organisation's most important asset," he said, and still says, "is its people." How different from a management, or indeed political, attitude in which people so often seem to be just regarded as too big a contribution to the expenditure side of a profit-and-loss account.

Not much of Deming's philosophy is heard of in the business and management schools. I guess that they are too steeped in the traditions of the old style of management which has slowly but surely lost the battle against the new style without even realising that a battle was being fought. That is why others must learn it and teach it. Deming claims that statisticians are particularly suitable for this job, because of their training in looking at things objectively, using facts, data, and all kinds of information, in a logical and unprejudiced fashion. That opinion is not universally accepted! Not all statisticians have the abilities and talents of Dr Deming, and I am pretty sure that I know a lot of statisticians who would be quite hopeless at tackling this kind of work. On the other hand, I do believe that the right kind of statistician, who is concerned with the real 'real world', as opposed to a more artificial 'real world' created to provide a stage for one's pet theories, can be ideal for this purpose. The Deming approach combines a "paradigm shift in management capability", as Bill Conway calls it, with the widespread, indeed universal, use of statistical thinking and methods throughout an organisation. And although the statistical content is *somewhat* different from what most of us teach or have been taught, the management side is *totally* different from the way that management people have been trained. So, on balance, that does seem to leave the statisticians with a little less to learn. But there is still plenty to learn, believe me. Without this combination of these two main aspects of Deming's teachings, the tremendous potential gains just will not be realised.

In order to help people understand and implement his way of thinking, Deming has produced a list of 14 Points for Management. They are based on what he told the Japanese in 1950. They are not written in tablets of stone; indeed he still quite frequently makes minor adjustments to some of them, reflecting the way that he sees the world changing and the changing needs of the people with whom he works. The list that you have before you is derived from five different versions that I have seen; the words are virtually all Deming's, but I have put them down in a format which I have found helpful to clarify some of the big issues involved.

If this is the first time that you have seen Deming's 14 Points, they may well appear an odd mixture to you; they certainly did to me when I first encountered them some 6 years ago. And to attempt to cover them in a short talk like this is rather like a vicar preaching a single sermon on the whole Bible. All I can hope to do is just make you aware of them and to stimulate sufficient interest in some of you that you will want to read more and think more about them. You will then be starting out on a route which could change your life—and that's not such an extravagant claim as you might imagine, at least not going by the number of Americans, both statisticians and management, whom I have heard using just those kinds of words.

Here then are the 14 Points. I shall follow each one with a few comments made as if you were a management team hearing them for the first time.

1 Constancy of purpose

Create constancy of purpose for continual improvement of products and service,

... allocating resources to provide for long-range needs rather than short-term profitability, with a plan to become competitive, to stay in business, and to provide jobs.

It is no good accepting Deming's approach in principle, and then forgetting it in practice. What has often happened is that managements have indicated their agreement, but have then allowed virtually anything else (i.e. all the 'old problems') to take priority. There must always be a consistent, inexorable, never-ending, widespread push for continual improvement in everything that an organisation does. People have become so used to new management gimmicks appearing every few weeks, or even days, which usually disappear as quickly as they come. It will take time, with such a history, for a proper belief to take hold that management is serious this time—and of course that will only happen if you really are. This can only be accomplished by you getting a deep understanding of the approach, and then setting a good example by your constancy of purpose constantly filtering down the organisation to feed and nurture a constancy of purpose throughout.

2 The new philosophy

Adopt the new philosophy for economic stability. We are in a new economic age,

... created in Japan. We can no longer live with commonly-accepted levels of delays, mistakes, defective materials, and defective workmanship. Transformation of Western management style is necessary to halt the continued decline of industry.

It is a whole new philosophy. It is not merely just a few guidelines, ideas and rules which can be tacked on to the end of whatever is done now. It involves a thorough, radical rethink—the most radical that you could ever realistically imagine. It may well involve a complete reversal of attitude towards many strategies and modes of behaviour to which both you, as management, and your workforce have become accustomed over the years. Quite simply, without the general realisation that we are talking about this fundamental a change, then it will not happen. In any case, it will not happen overnight. There must be a constant, consistent movement in the right direction—every day a company must move closer to the philosophy of ever-improving quality of all systems, processes and activities under its direction.

3 Cease dependence on inspection

Eliminate the need for mass inspection as a way to achieve quality

... by building quality into the product in the first place. Require statistical evidence of built-in quality in both manufacturing and purchasing functions.

Some peoples' initial reaction to this instruction from Dr Deming may well be to laugh. If so, that only demonstrates how terribly far away their standards are from those which he demands—and which are being achieved by those who have accepted his message. We have become so used to poor quality in supplies, systems, service and expectations, and to such a high level of mistakes, errors and defects, that we may have come to accept as a 'fact of life' that this is the way things are and must forever

be. But an undeniable result of reaching consistent high standards (such consistency being ensured by statistical evidence and methods of process control) is that mass inspection indeed becomes no longer necessary. Tremendous cost-savings are then available, both by eradication of the expensive, non-productive activity of inspection, and by the security of working with reliable, dependable, consistent high-quality materials and processes. And think of what the resulting high-quality, competitive end-products will then do for your company's reputation both with existing and potential customers.

4 End 'lowest tender' contracts

End the practice of awarding business solely on the basis of price tag.
... Instead, require meaningful measures of quality along with price.
Reduce the number of suppliers for the same item by eliminating those that do not qualify with statistical evidence of quality. The aim is to minimise total cost, not merely initial cost. Purchasing managers have a new job, and must learn it.

This is very much connected with Point 3. The necessity for inspection of the input from our suppliers can only be ended if we can trust those suppliers to have the same high standards as ourselves. This implies a positive, co-operative, long-running relationship with a reduced number of chosen suppliers who can and will fulfil our needs. The savings obtainable from such a relationship with reliable suppliers, and the trustworthy materials and service resulting, outstrips to a dramatic degree the 'savings' attainable by merely going for the lowest price. The costs incurred within our operation, and possibly subsequent to it, as a result of using cheap, low-quality input, are likely to be enormous, quite possibly incalculable. At best, there will be substantial rework necessary, delays, and irregular throughput within our operation; at worst, the bad material may slip through our operation, leaving our customer to find it out. And, if our customer suffers, be sure that he will make us suffer as a consequence, and rightly so.

5 Continually seek out problems

Search continually for problems, to constantly and forever improve the systems of production and service and every other activity in the company,
... to improve quality and productivity and thus to constantly decrease costs. It is the management's job to work continually on the system (design, incoming materials, maintenance, improvement of machines, training, supervision, retraining).

There is at present far too great a tendency to 'hope for the best', to 'turn a blind eye', and to 'let things ride' regarding potential problems—only paying attention to them when they become obviously serious and may well have already caused our company some considerable harm. Far better to seek them out early, to 'nip them in the bud', before they cause real trouble (this is the particular task of the monitoring phase of statistical control schemes). This is a basic difference between crisis management and good management. Never be content; even when some problems have been sorted out, and some improvement has thereby been obtained, it is in the nature of things that further improvement is always possible, but it will only be achieved if further problems are identified and solved. And if you don't find out problems, be sure they will find you out.

6 Institute training on the job

Institute modern methods of training on and for the job,
... including management, to make better use of all employees.

How can anybody, staff or management, do their job properly if they do not know what their job is? Training is short-sightedly regarded as 'non-productive' by many managements, and is thus one of the first things to go when finances are tight. How wrong! Think how little proper training costs, as a proportion of the total costs involved with an employee over the months and years he may be working for your company. It is minute in comparison to the potential advantage to the company of that worker understanding his job, so that he can do it properly and to the company's best advantage. And this doesn't even include the unquantifiable gain to the company of that worker gaining satisfaction and pleasure from doing a good job—and thus *wanting* to continue so doing and improving yet further.

7 Institute supervision

Institute modern methods of supervision (leadership), focusing on helping people and machines to do a better job.

... The responsibility of supervisors must be changed from sheer numbers to quality. Improvement of quality will automatically improve productivity. Management must ensure that immediate action is taken on reports of inherited defects, maintenance requirements, poor tools, fuzzy operational definitions, and other conditions detrimental to quality.

If a foreman or supervisor has to spend his time chasing the people for whom he is responsible, and browbeating them to 'do a proper job' or to keep up to schedule, that in itself is a clear comment on the low standard of the operation concerned. Workers must be given interest in the work that they are being asked to do, and be helped to do it well. And these are complementary activities—if they are interested then they will want to do it well and accept help to enable that; and if it is made possible for them to do it well then their interest in it will increase—and so the cycle continues. Far too often, one sees the opposite kind of cycle: the vicious circle. Conditions force a worker to do a bad job; so he loses some of the interest that he has, which results in him doing a yet poorer job, which lessens his interest still further, and so on.

8 Drive out fear

Encourage effective two-way communication and other means to drive out fear throughout the organisation,
... so that everybody may work effectively and more productively for the company.

Anybody working in fear of his superiors cannot be working in true co-operation with those superiors. The best that can be hoped for in such circumstances is to get people working in resentful acquiescence—maybe that is all that some superiors desire. However, this will never result in much progress. Successful joint working relationships achieve so much more than isolated individual efforts—but will not do so unless nourished by mutual trust, confidence and respect. Those working in fear try to withdraw from the attention of those of whom they are afraid. And how can you expect to get anything of the true potential from people whose main aim is not to be

noticed? Point 9 will concern the breaking down of barriers between departments. It is just as important to break down barriers between staff and their supervisors, between those supervisors and middle management, between middle and senior management, and between senior management and the chief executive officer. But fear will keep those barriers firmly in position.

9 Break down barriers

Break down barriers between departments.

... People in different areas such as research, design, sales, administration, and production must work in teams to tackle problems that may be encountered with products or service.

Different sections of an organisation have their own interests, their own traditions, their own values, their own 'sacred cows', often, in effect, their own language. So, unless they have extremely good cause, they will automatically fight against their fellow-employees with whose interests they appear to be in conflict. The company will only make headway if its employees start fighting the competition rather than themselves. Frequently a minor change in one department can afford considerable help to another—often with the resulting desire to 'return the compliment'. But such will only happen if the departments concerned have real understanding of each others' difficulties. The common language of elementary statistical methods and charting techniques, which are of course powerful and useful tools in their own right, is extremely effective in enabling people to gain an understanding of each others' jobs and problems, and how they may be helped.

10 Eliminate exhortations

Eliminate the use of slogans, posters, and exhortations

... for the workforce, demanding zero defects and new levels of productivity, without providing methods. Such exhortations only create adversarial relationships; the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the workforce.

'Do it right the first time'; 'Zero defects is our aim'; 'Increase output by x%'; and countless others. How can anybody do it right the first time if he is given neither the time nor the materials or equipment to make it feasible? How can he produce zero defects if what he gets to work on is already defective? And his already-low job satisfaction will drop even more if he is exhorted to produce greater quantities which he knows will, under the prevailing detrimental conditions, lower the standards of what he is producing still further, however hard he tries to prevent it. Make *reasonable* requests, and provide what is necessary for them to be met, and you may well get *better* than you ask for. Make unreasonable requests, and you will get even less than you would have got otherwise from an increasingly-demoralised worker.

11 Eliminate targets

Eliminate work standards that prescribe numerical quotas and goals (targets).

... Substitute aids and helpful supervision; use statistical methods for continual improvement of quality and productivity.

Targets can never be right except very occasionally by accident. If a target is lower

than what turns out to be reasonably achievable, the automatic reaction is for workers to take a rest once that target has been reached—and why shouldn't they? If the target is unreasonable, then either it will not be attained (resulting in criticism, loss of bonus, demoralisation—all at no fault of the workforce), or it will be attained through cutting corners, lowering standards, ignoring safety requirements, etc.: the right numbers may be attainable, but at what cost in quality, with all the ramifications that may have further down the line or, worse still, at the customer's? In either case, workers' respect for their management's ability to manage will justifiably take a further dive.

12 Permit pride of workmanship

Remove the barriers that rob hourly workers, and people in management, of their right to pride of workmanship.

. . . This implies, *inter alia*, abolition of the annual merit rating (appraisal of performance), and of management by objective. Again, the responsibility of supervisors must be changed from sheer numbers to quality.

So many barriers to pride of workmanship exist, several of which have been touched on already. How can a worker be proud of what he is doing if he is being forced to produce shoddy goods, because of poor materials, poor tools, unreasonable quantities of throughput being demanded? How can he be proud of what he is doing if he can see ways of improvement but knows it is pointless to try to discuss them with his superiors—so he reluctantly carries on in the same old way which he knows to be a bad way? How can a manager be proud of what he does if the effect is to reduce quality and make his workers even less happy in their work? How can he be proud of what he does if there is no time or encouragement to try to improve morale and productivity by instigating improvements to processes and methods in order to raise quality? The value of what a worker, of whatever rank, produces will be almost immeasurably higher if he is enabled and encouraged to take pride in his work, compared with what he does if he is merely serving time.

13 Institute education

Institute a vigorous program of education and re-training.

. . . New skills are required to keep up with changes in materials, methods, product design, machinery, techniques, and service.

Things change fast in the modern world. There is, of course, little point in change for change's sake but, without being aware of change, how can we decide? Without being aware of change, and the potential benefits that it might bring, how can we, or the company, have any chance of benefitting from it? How can things improve without change? And how can change occur without knowledge of it? The use of elementary statistical methods throughout an organisation yields untold benefits by helping both in the identification and subsequently the solution of problems, by predicting the effects of change, and by examining those effects once change has been made, by generating individual interest, and by facilitating communication with other departments and with superiors or those under our supervision. So *all* members of the company should be trained in these methods and helped in their use of them. If a job or position in the company becomes outmoded, the person holding that position needs

retraining for more valuable work. Use of the common statistical language will help him to comprehend his new tasks more easily and completely.

14 Top management's commitment

Clearly define top management's permanent commitment to ever-improving quality and productivity,

... and its obligation to implement all of these principles. Create a structure in top management that will push every day on the preceding 13 points, in order to accomplish transformation.

It all begins and can end here. Without full top management belief, understanding and commitment, progress (if any) will be sporadic and temporary at best. Top management must lead the whole organisation in the drive for ever-improving quality of every activity in the company by providing proper encouragement, training, facilities, time—and by practising what they preach. In particular, they must accept that they also have much to learn, and be prepared to learn it. What, for example, is the point of training everybody from middle management downwards in statistical charting techniques and process control if top management cannot, or rather will not, understand the reports, results, analyses, and recommendations emanating from the use of these methods? Of course, top management are very busy people. And that is why it is so necessary to set up a positive and permanent structure within management with the sole task of encouraging and facilitating continuing and continual progress in the new direction. It is hard work—Deming has never claimed otherwise—and the need for 'commitment' and faith will never have been greater. But the potential rewards, and degree of success, for you and your company are huge.

As I said earlier, to those of you who are hearing of Deming's management philosophy for the first time, this must have seemed quite a mixture. Probably some of the Points have seemed obvious, others questionable, and some downright impossible. It is also difficult at first sight to see how they all hang together in a coordinated framework. But they do. Perhaps the best attempt that I have seen to present the 14 Points as a relatively brief composite statement is in the Quality Philosophy of the Pontiac Division of General Motors. I will finish by quoting that summary to you:

Pontiac Motor Division commits itself to quality as our number one business objective. We are dedicated to operating under Dr Deming's philosophy of management, including extensive application of statistical techniques and team-building efforts. We intend to be innovative and to allocate resources to fulfil the long-range needs of the customer and the company. We will institute better job training, including the help of statistical methods, and will 'do it right the first time', eliminating scrap and waste. We will provide a vigorous program for retraining people in new skills, to keep up with changes in materials, methods, design of products, and machinery, and in the use of statistical techniques to identify areas of improvement. We will reduce fear by encouraging open two-way communication. We renounce the old philosophy of accepting defective workmanship in everything we do—paperwork, processes, and hardware. We must eliminate the dependence on mass inspection for quality. We will maximize the use of statistical knowledge and talent in both our division and our suppliers. We will demand and expect suppliers to use statistical process control to ensure quality. Where possible, we will single-source purchased items with the supplier who demonstrates the highest level of quality through statistical means.

Recommended Reading

- DEMING, W. EDWARDS (1986) *Out of the Crisis* (Massachusetts Institute of Technology, Center for Advanced Engineering Study, Cambridge, MA 02139, USA).
- SCHERKENBACH, WILLIAM W. (1986) *The Deming Route to Quality and Productivity: road maps and roadblocks* (CEEP Press, George Washington University, Washington DC 20052 USA).
- MANN, NANCY R. (1985) *The Keys to Excellence: the story of the Deming Philosophy* (Prestwick Books, 2106 Wiltshire Boulevard, Santa Monica, CA 90403, USA).

These books are all obtainable through:

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