



Putting the quality in Quality Bakers

The computer chip and contemporary bread-making

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This paper arises out of work I have been doing for the past two and a half years, now moving towards publication, on a major New Zealand bread baking company, called Quality Bakers New Zealand Ltd. The name itself is probably little known to you though you will be much more aware of the Goodman Fielder empire which grew out of and was in large part originally financed by the baking company.

I am not going to give a potted history of Quality Bakers as a whole, except what is needed to make the story comprehensible, but to look at the gradual adoption over many years of what is these days called Total Quality Management, or as it is within that company, 'the QB Way'. This may seem an odd preoccupation for an historian because it is a subject which still seems to be treated purely as a management technique without much philosophical content.

However, over the last three or four years I have been working almost wholly in contemporary history – and I do mean contemporary. In some cases I have virtually been standing by the scene of the action scribbling as it unfolds – not only in this commercial scene but also in one of the new Government ministries – and I have become conscious that superior quality assurance systems under various names and guises are rapidly emerging as one of the important secular ideologies of our times. They do not, or at least do not yet, take an openly political form, though I believe this could happen; nor are they overtly a religion or philosophy, though they are in their own way idealistic. After writing these words I came across the following comment in a Japanese textbook on Total Quality Management or Kaizen as it is known in Japan:

Opposite: An interior view of a modern plant bakery showing a high-speed mixer open after mixing a batch which is being transferred by the dough hoist to the loaf divider on the right.

Quite recently, after a day-long discussion on the Kaizen concept, William Manly, senior vice president of the Cabot Corporation, quipped, "I thought they had two major religions in Japan: Buddhism and Shintoism. Now I find they have a third: Kaizen!". Facetious though this sounds, one should have a religious zeal in promoting the Kaizen strategy and not be concerned with the immediate payout ... Kaizen is based on a belief in people's inherent desire for quality and worth and management has to believe that it is going to 'pay' in the long run.¹

When applied wholeheartedly, and not just as a lip-service, Total Quality Management, or TQM (I will use this term as a convenient, familiar shorthand for a number of similar approaches), is capable of transforming economic performance and workplace relationships and of liberating energy and confidence in the people practising it. It is also inherently evangelical, because no company can aim to eliminate faults and inefficiencies in itself without putting pressure on its suppliers and distributors to meet the same standards. (QB for instance came under pressure particularly from McDonalds and KFC which are enormous consumers of bread rolls and buns and absolutely rigid in their requirements; in turn QB has leaned on the flour industry and the Wheat Research Institute with the result that the WRI and some milling companies have now achieved or are moving towards accreditation for ISO-9002.) Something which can get these results seems to me as worthy of attention as the other 'isms' and 'ologies' that we fret ourselves over.

Let me forestall objections here by saying that I am aware that TQM has its critics. Just last week a visiting US labour journalist had some harsh things to say about it in the *Dominion* associating it with casualisation of the work force and of being a cloak for redundancies and cost-cutting among other things. If it is adopted just as another set of trendy slogans with no real underlying change; if it is imposed holus-bolus as a foreign system without adaptation to local needs, or if management does not roll up its own sleeves and lead by example the results may indeed be as bad as she claimed. Even when done well, like all human systems, it has its down side and dangers. For the present purposes, however, in the words of the song, I am going to accentuate the positive. So far as I can tell, Quality Bakers has gone the whole hog honestly and is very satisfied with the results.

What I am talking about here is not quality control as it has been practised from time immemorial. Every consci-



entious business has always inspected finished goods for faults before they went out. This is a reactive process, picking up errors after they have occurred. I am talking here about the ideas which have emerged in the USA and, even more, in Japan since World War Two. These take an intensely pro-active attitude to product quality, aiming to create an environment so organised, so self-scrutinising that faults do not occur. Processes and materials are minutely specified and standardised to eliminate chance and error so far as possible and the entire workforce from top management to the newest recruits are expected, trained and encouraged to contribute to continuous ongoing improvement. Put at its simplest, it is a philosophy of doing everything only once and getting it right every time. Adaptations of the idea have been developed for service and administrative settings, though perhaps less appropriately and with less success.

In some respects it reminds me of the reforming monastic orders of the Middle Ages, such as the Cistercians, or of seventeenth- and eighteenth-century puritan and Quaker business communities. In all three cases there was an austere, perfectionist attitude towards work which paradoxically conferred a great sense of freedom on those who undertook it voluntarily. And it is no coincidence that all three were runaway successes economically.

In the first two cases work was done to the greater glory of God; in the modern case I am not sure that I yet understand what drives it. Neither the official ideology of customer service nor the satisfaction of making handsome profits seem enough by themselves to account for the zeal and zest that are sometimes in evidence though there is no doubt they help. I suspect that one important fact is that the technician and scientist are the foot-soldiers of this particular army and that their mentality and training are very attracted to the idea of perfection for its own sake.

I have been watching the TV programme 'Made in

New Zealand' with interest because many of the success stories reported there are parallel to the QB experience. Some of the enthusiasm that comes across is a sheer joy in doing something to the very best of one's ability, and being rewarded for it, after earlier experience of working in a more mediocre way. This is clearly partly a result of the recent deregulation of the economy with all its attendant opportunities and perils.

At first sight it might seem that an idea developed for industrial mass-production situations like car assembly plants and electrical goods factories would have little to do with something so natural and variable as bread baking, but the bread industry, under certain conditions, is well suited to it. It is an industry which has a limited and standardised range of products and where failures are comparatively easy to prevent but absolutely impossible to correct; a burnt, underweight or under-baked loaf is a dead loss. Wastage through 'cripples', as damaged or unsaleable loaves are known, has always been one of the chief drains upon bakery profits. Notwithstanding the development of bread-crumbs by-products, prevention is better than using up mistakes. This applies not only to manufacturing errors but also to sales and distribution where over-ordering or late delivery may result in unsold bread, which again is an almost total loss. Finally, feedback from either mistakes or successes is immediate and measurable which means it is possible to learn and adapt very quickly.

However, the key phrase is 'under certain conditions'. Those did not exist before the early 1980s but then came into existence quite rapidly. External factors included, as an absolute necessity, the de-control of the wheat and flour industry in 1987, the end of price control and the abolition of the 150km road transport limit in 1981 and 1983 respectively. Factors internal to the industry comprised two waves of new technology which allowed more exact control of production processes, and the willingness to spend a considerable amount of time and money on staff training in order to ensure that they had the skill to get the best out of the new technology.

An important theme in the modernisation of the baking industry has been the improvement of transport of a highly perishable product. The old horse-drawn van, above, could deliver only over a few kilometres, restricting the size of bakeries to small local enterprises. The modern bread van, opposite, can cover an entire provincial area in a few hours and has been a major agent in the concentration of plant bakeries into fewer, larger units. Developments in packaging and baking techniques which allow the bread to remain fresh longer have been another aspect of this.

In the case of Quality Bakers I know that the company was groping and stumbling its way towards the goals represented by TQM from the late 1960s, long before the term itself was invented and before the ideas were familiar in New Zealand. In fact one of the main stated reasons for the original formation of the company as a bakers' co-operative in 1968 was to raise production standards. It feels it has entered upon the Promised Land since 1990. Its three export plants are due to receive ISO-9002 accreditation any time now. It was twenty years getting there and much of my history revolves around the factors which both impelled it in that direction and those which prevented it from arriving sooner. During that time other sectors of the food industry, under pressure to meet export standards, got into quality management programmes more quickly and baking lagged behind for a while. I want to make a brief tour of what I think were the main factors because this apparently alien seed fell upon local soil which was already highly receptive to it.

The indispensable figure in this process is a man called John Gould, the son of the Ohakune baker and a baker himself. I believe he was the only person in the commercial bread baking industry to gain a university degree in the late 1950s and he has without doubt the mentality and attributes of a true scientist; indeed, he is probably one of New Zealand's unsung technical innovators. After serving briefly at the Wheat Research Institute he went back to the family business but by virtue of his BSc He was quickly propelled into the technical leadership of both the industry at large and, from 1968, Quality Bakers Ltd which was initially a co-operative of eight small local bakeries including his own. At that time his grasp of technical possibilities would have been shared only by one or two others who had escaped the narrow confines of the family business and had their horizons broadened by contact with, for example, the Wheat Research Institute or overseas baking industry. You must bear in mind that in those days

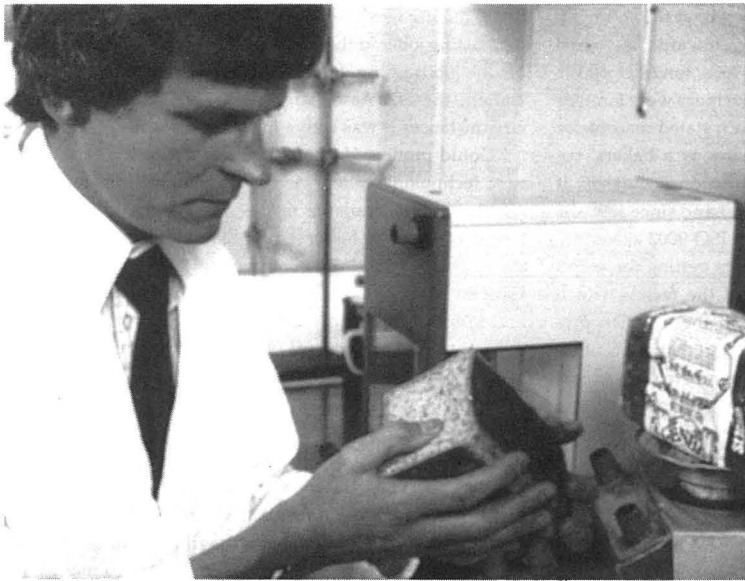
bread baking was still an enormously arduous, physically exhausting job and there was precious little spare time for off-the-job training. It was to the credit of the trade association, the NZ Association of Bakers, that despite the circumstances it was active in trade education.

Gould pioneered, though he did not invent, a radical new technology called Mechanical Dough Development which became available in the late 1960s. He is now a world expert on it; he served for many years on the Wheat Board and the Wheat Research Committee and is at present General Manager Technical of Goodman Fielder Baking and Milling. He was not alone in believing that the bread industry could perform far better than it was then doing – the baking trade in general was deeply frustrated and dissatisfied – but he was for a long time alone in understanding the full extent of what needed to be done. He told me that when he first encountered the idea of what was then called Quality Circles in 1982 it came as more of a relief than a surprise. It formalised and gave a theoretical framework to all he had been struggling to do piecemeal for twenty-five years. I think it is important to make the point that though the theory came via Japan it did not seem alien but sat comfortably with a western scientific and technical outlook.

I will digress a moment to explain the situation of the bread industry up to the end of the 1970s and why bakers were frustrated and dissatisfied. This was because it had been frozen in time since the late 1930s and was by now at the bottom of a long trough of decay and technical backwardness. This was the unintended result of emergency measures by the Labour Government in 1936-37 to place the wheat-growing, flour-milling and bread-baking industries under stringent central control through a body originally called the Wheat Committee and later the Wheat Board. The Wheat Committee was empowered to buy the entire domestic wheat crop from the farmers and sell it to millers under a cumbersome and eventually grotesquely inefficient quota system. To ensure uniformity of prices throughout New Zealand, an elaborate system of subsidies, price controls and product specifications was created.

The original idea was to make sure bread was universally available at a reasonable price during the depression, and then World War II and the post-war reconstruction. As such it would be hard to quarrel with. But the system was kept in place almost unaltered into the 1960s for purely political reasons: it pleased the farmers and millers who supported National Governments and the public had grown to expect subsidised bread.





However, it bore hard upon the baking industry for a number of reasons, particularly to do with the quality of the product. It is not generally understood outside the baking trade that flour is as variable and specific in its qualities as, say, grapes are. You can make wine with any sort of grapes if you are not fussy about the outcome but if you want a riesling wine you must use a riesling grape. You can make bread of a sort with most kinds of flour, but if you do not want it to be full of holes, or grey or stale within four hours you must use a specific bread flour and the same is true for cakes, biscuits and other purposes. Skilful treatment can overcome some of the problems but not all.

The way the Wheat Committee's brief was structured it could not legally make any distinction in qualities for end uses. It bought all but the very poorest wheat and it was all milled indiscriminately. Bread-bakers, pastry cooks, biscuit factories and poultry-food manufacturers all just got what they were sent and had to make the best of it. This went on with only minor modification until 1987. Any older baker will tell you by the hour of the way their lives were ruled by the unpredictable variations in flour quality.

However, the industry did not resign itself apathetically to the situation. It fought it politically, though to limited effect but, more significantly, it became receptive to any new idea or technology which would help it cope with the mediocrity of its main ingredients. In this respect it was significantly different from other controlled and protected industries of this period which became notoriously slothful and rigid.

One may add that the bread industry was kept awake also by the fact that it did not prosper under these controlled conditions. Like the meat, dairy and brewing indus-

tries, baking went through a long process of amalgamation and rationalisation from the 1940s which resulted in 90 percent of businesses going to the wall. From some 700 bread bakeries operating in 1936, the number was reduced to about 70 in the early 1970s.

Price control did not cause this, though the bakers complained that it did. It was a natural development for all sorts of other reasons with which you are certainly familiar. However, it aggravated the situation. Price control in this industry was based on an arbitrary profit level of 8% after tax and other liabilities (later raised to 11%). This was too low to permit reinvestment and modernisa-

tion especially since new equipment becoming available in the 1950s was vastly more expensive than earlier models. Baking equipment at that time had an economic life of 25-30 years. There was a wave of modernisation in the 1930s when electric ovens displaced wood and coal-fired ones but these were on their last legs in the late 1950s and early 1960s and price control hindered even many of the more viable businesses in becoming up-to-date.

So, on top of enforced mediocrity of the main ingredient, the industry was trapped at a technologically backward level and bitterly resented it. This was what caused the frustration I mentioned earlier and fuelled the desire by the industry to fight its way out of a situation in which it felt its own performance was unjustly sacrificed to the interests of both the government and the wheat-growers and flour-millers. I believe this dissatisfaction had to be there to make the industry want to go on the long, hard road to improvement.

Another outcome of this long period of arrested development was that the baking trade never became truly industrialised in the way that the meat industry did. With the exception of half a dozen big city bakeries, the great

Above: Monthly loaf evaluations have been at the heart of Quality Bakers' quality assurance system ever since the company was first formed as a co-operative of independent bakeries in 1968. This photograph, taken in 1988, shows food technologist Tom Robertson examining the crumb structure of an unsliced Molenburg loaf. Every bakery's products are sampled at random every month and the results published, so creating keen internal competition.

Opposite A high-speed mixer for the Mechanical Dough Development (MDD) process, showing its microprocessor control panel at the left.

majority were small family craftsman outfits. The industry in New Zealand, though not elsewhere, never went through the process of de-skilling typical of early industrialisation and there was never the hostility between capital and labour that emerged in the freezing industry. There was therefore a largely skilled workforce with great pride in its skills, receptive to new ideas and itching to do much better than its circumstances allowed.

In the late 1960s a radically new form of bakery technology emerged from the British baking industry. This was called Mechanical Dough Development and allowed bread to be produced in a fraction of the time of conventional ('bulk fermentation') bread-making. This was different from and much better than earlier high speed systems which had been developed and adopted mainly in the USA but were never used at all in New Zealand. I will not be able to go into all the considerable ramifications of MDD, but because it was incomparably more cost-effective than either old-style methods or alternative modern systems it became the technology of choice for bakery modernisation in New Zealand. Quality Bakers was formed largely to enable its member companies to pool their finances to adopt this method. That, however, is beside my main point in this paper.

The point I am making in regard to improved performance in the industry was that the MDD process was much more exact than old style bulk fermentation methods. Flour quality, proportions of flour to water, dough temperature, yeast activity and mixing time all became more critical variables. An error of 5 percent in any of them was unacceptable and even 2 percent was undesirable. Much of the company's energy in the 1970s and 1980s went into gaining mastery of all these critical factors. I began to realise in the course of writing about these that it was in its very nature an all-or-nothing exercise. The way the factors interlocked it was not possible to improve one without a corresponding change in all the others.

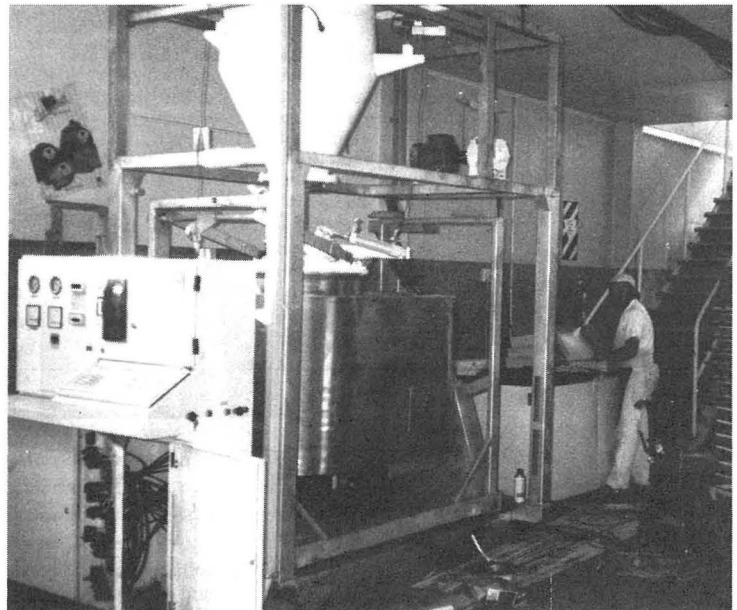
The ramifications were astonishing and each one was a saga in itself involving either some significant technical innovation, an entirely new business venture to provide for requirements which could not otherwise be met, or a fight with government to try to free up some area of the regulations.

The battle over flour quality took on a new edge because MDD could not deliver its best results with the variable flour available. However because the Government did not give an inch on that until 1977, the

MDD process itself had to be refined and adapted to the flour available. The result was that New Zealand is now the world leader in this particular field; the people involved were in fact too modest to realise that until quite recently. The abolition of the Wheat Board in 1987 has resulted in a revolution of home grown wheat and flour quality: some of those now available are considered equal to or even better than the Australian ones. More to the point, it is now possible for bakeries to specify exactly what flour they want and get it.

In order to get the faster, stronger yeasts which the MDD process requires, Quality Bakers went into the yeast making business for itself in consortium with two other companies. Yeast, however, must be distributed rapidly and at a controlled temperature if its potency is not to be impaired. This made the company an early pioneer of refrigerated road transport. I will not even get into the question of what effect the 150 km road transport limit had on the distribution of perishable commodities, but this was another big issue until it was removed in 1983.

A major technical refinement came with the appearance of microprocessor controls for the various bakery processes involving ingredient weighing, work input, timing, temperature and other factors. Microprocessors came over the horizon in the late 1970s but at that time very little could be bought off the shelf. If you wanted them you had to make them yourself which was what happened here. QB's National Engineering Manager got together with a bright young electrician from Christchurch and they worked out from first principles how to apply these devices to bakery equipment. This was a difficult exercise because bread dough is for practical purposes a living



substance, constantly changing in its volume, density, stickiness, and temperature. Devising sensors which could react intelligently to these parameters was a knotty problem but they came up with a simple and elegant solution to it. That is considered to have been the critical breakthrough in getting consistent product quality.

So, to review what we have here: by the late 1980s ingredients had been improved and standardised, the transport sector had been freed up, and technical processes had been greatly refined.

The last issue I want to comment on is staff training because it is in many ways the cord that binds the whole bundle together. It would have been possible with all the improvements in inputs to let workforce skills decay and let the machine do it all, as has happened with plant baking in most industrialised countries. The present Technical Manager spent some time working in the British industry and she told me that it was run largely on unskilled labour – the product was poor and the people had neither the skills nor the initiative to solve their own problems.

I think QB went some way down the track for several years – for example, in the late 1970s and early 1980s they were rather slack about apprentice training. Since that time, however, there has been a conscious policy of constantly upgrading skills so that the operatives know how to get the best out of their new processes and ingredients and can solve their own problems systematically. Training is a required part of the TQM programme and staff and resources are allocated to it. This began in 1982 but has really got off the ground since 1985.

However, like everything else I have mentioned, there is more to training than appears at first glance. It is not just a matter of teaching people how to use a new machine or having a post-mortem on why something went wrong. Underlying it is a policy to change the mentality of the bakers from the old-style artisan attitude to the technician approach required by both TQM and the new processes. John Gould, who after all is both an artisan and a scientist, explained to me that artisans are brought up to observe the processes and adjust them if necessary as they go along, in other words to react to variations. Technicians are trained to think through and analyse their processes and make necessary adjustments before starting, to take a pro-active stance to forestall variation. And this gets us back by a very long route to where we started out with the theory of TQM.

By the end of the 1980s all the necessary ingredients were in place, and New Zealand was in the middle of a severe depression which sharpened up the competitive environment. The theories of quality assurance had been floating around in the company for several years and management in general was in favour but the whole thing had not been put together completely. The key was finally turned in the lock when John Gould and the Managing Director, Brian Robinson, attended a seminar at the Kaizen Institute near Tokyo in 1990, the home of TQM. With Gould, of course, they were preaching to the converted. But Robinson was bowled over by it, not so much by the lectures but by factory visits, particularly one to the Brother sewing machine assembly plant. This had achieved a rejection rate of



J.T. (John) Gould, present General Manager Technical, Goodman Fielder Baking and Milling, Sydney. Gould is the architect of Quality Bakers' quality policies and a life-long battler for improved wheat and flour.



R.E. (Rod) Vallance, National Engineering Manager, Quality Bakers (NZ) Ltd. Vallance was one of the designers of the first microprocessor controls which made bakery processes far more exact than previously, which was the technical development on which all present quality policies are founded.



B.D. (Brian) Robinson, former Managing Director, Quality Bakers New Zealand Ltd, now of Quality Bakers, Australia. Robinson's conversion to the theory of Total Quality Management gave John Gould the support necessary for the company to adopt it wholeheartedly.



An extensive system of internal awards and trophies has been created to encourage excellence not only in production but in sales, customer relations, clerical and other areas. The baker pictured is Ray Hapwood, then of Findlays Gold Crust Bakery Auckland, who had won four of the main product trophies.

faulty components of under 10 parts per million. Robinson was quite blown away by this: "In New Zealand we were still accepting 10,000 faults per million and thought it was OK. That really made me take notice". He came back just as fired-up as Gould and had the authority to ensure that it was finally taken seriously with QB.

However, the Japanese experience which looks so important was only the coping stone on a whole structure of local effort and experience going back many years. Even after 1990 QB found they could not just buy TQM off the shelf, as it were. They had to adapt it quite extensively to their own situation and, in recognition of this, they coined their own name for it, 'the QB Way' which encompasses not only production processes but customer relations, health and safety, relations with suppliers, sales and distribution. As an added refinement, three of the company's plants have been designated as export sites and are undergoing accreditation for the internationally recognised quality control standard ISO-9002. This process has also been used to improve standards in the other domestic plants.

I want to wind up with a few general thoughts about the wider implications of these work practices, just to raise some issues which I have certainly not worked through in full. What happens in one company perhaps does not make much difference to society as a whole, but if large numbers of people are working in that particular mental and physical environment it may produce some social effects. The first industrial revolution permanently modi-

fied social relationships and behaviour and there is potential for this new phase to do the same.

One thing I wonder about is the effect of thinking and working exclusively in this highly logical, self-scrutinising mode. Will it tend to make people more rational, or will they project their emotional lives out into some other, as yet unpredictable, direction? The first industrial revolution was accompanied in Britain by the Romantic movement and the Methodist revival, both of which were in some respects reactions against steam-driven, clock-watching rationalism. Could we see something like this again? What will be the effects on those many human beings who are not naturally rational and self-scrutinising. How will they fare?

What will be the effect on creativity of eliminating chance and error, which are the food of imagination? We know that Japanese society though highly disciplined seems not to be very creative. The sloppy, uncouth West on the other hand does seem to be so. Will we become both creative and disciplined under this sort of regime or do we risk drying up the springs of our own innovation?

What are the consequences for industrial relations of TQM-type systems? At present it appears to place a lot of power in the hands of management, but that may be less because of anything intrinsic to TQM than because we are in an economic crisis and it is a buyer's market for labour. To work well TQM requires a relatively 'flat' organisation (ie, no complicated hierarchy of command) and free circulation of information and is to that extent quite democratic. What will happen when times are less hard and people are less inclined to co-operate? Who will be master then?

FOOTNOTE

1 The following definition of Total Quality Control, an alternative name for Total Quality Management, is taken from M. Imai, *Kaizen*, McGraw-Hill, 1986, pp 13-14 ('Kaizen' is the Japanese word for 'improvement'). This is the 'Bible' of TQM.

First of all it should be pointed out that TQC activities in Japan are not concerned solely with quality control. People have been fooled by the term 'quality control' and have often construed it within the narrow discipline of product-quality control...

TQC in Japan is a movement centred on improvement of managerial performance at all levels. As such it has typically dealt with:

1. Quality assurance
2. Cost reduction
3. Meeting production quotas
4. Meeting delivery schedules
5. Safety
6. New product development
7. Productivity improvement
8. Supplier management

More recently, TQC has come to include marketing, sales and service as well.

In an industrial setting TQM is implemented by creating and enforcing exact specifications for all products and processes and establishing procedures for dealing immediately and effectively with any deviation. However, the author of the text cited above insists that it must be inspired by a desire at all levels of the company to make constant improvements and management structures must be flexible and open to suggestion. It must not be applied as a rigid 'painting-by-numbers' formula or as a disguise for other less worthy management objectives.