AN APPROACH TO IMPROVING MANAGEMENT PERFORMANCE

(On the importance of philosophy and knowledge in the leadership and management of organisations aiming towards the goal of economic-quality)

by
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PART ONE – PHILOSOPHY
The Framework of Reason

HISTORICAL PERSPECTIVE

The current enthusiasm for the management of quality provides a refreshing and promising contrast to the traditional attachment to financial management. However, while financial management in the UK and US in particular has enjoyed a distinguished history over the past four decades of eventually seeing whole industries to their death, or at least to an indifferent old age, the principles which guide the management of quality have ensured that commited organisations arise from the ashes, or the unknown, to take over established markets and transform the global marketplace to favour the long-ignored customer.

One of the earliest expressions of a belief in quality being the essential pre-requisite for commercial success came from Louis XIV's finance minister, Jean-Baptiste Colbert (1619-1683), who founded the Gobelins royal furnishings factory in 1662 under the brilliant leadership of Charles Le Brun. In August 1664 he observed that:

> "*If our factories, through careful work, assure the quality of our products, it will be to the foreigners' interest to get supplies from us, and their money will flow into the Kingdom.*"

Although Colbert had a narrow view of wealth creation (by national domination rather than through international co-operation) and believed in detailed central control, so much so that faulty workmanship or deviation from standard procedure often resulted in punishments by fine and pillory,

he made a major contribution to advancing the standards of excellence by which industry was measured.

A century or more later manufacturing excellence reached new heights with the porcelain products of the Sèvres factories near to Versailles and the pottery towns around Stoke-on-Trent with the discovery of hard paste in 1769 which permitted new levels of refinement to be reached in the manufacture of delicate tableware.

A further century forward and a weaver's lad from Dunfermline, who emigrated to Pittsburgh in the summer of 1848, progressed from telegraph messenger-boy to self-taught railway manager with the Pennsylvania Railroad before going into business in his own right to manufacture cast iron and, later, steel, so eventually becoming one of the most successful industrialists of all time. Named Andrew Carnegie (1835-1919) he articulated the essence of his fast growing success in 1868, at age 33, when he observed that:

"*I have never known a concern to make a decided success that did not do good, honest work, and even in these days of the fiercest competition when everything would seem to be a matter of price, there lies still at the root of great business success the very much more important factor of quality.*"

As a child the famous English essayist James Henry Leigh Hunt (1784-1859) grew up in London amidst the early years of the Industrial Revolution. As Carnegie's father had sailed west to find independence for his family from the grinding poverty of Scotland so Hunt's father, a well heeled Philadelphian lawyer, had sailed east some years earlier, in 1812, to escape from the new independence movement and return to the land of his loyalties. The great social and economic changes afoot did not escape the notice of James who observed:

"*There are two worlds: the world we measure with line and rule, and the world we feel with our hearts and imaginations.*"

As man and machine, technique and technology wrestled with the growing demands of a world driven by a need for the creation of property, material and wealth the artificers and artisans, technicians and mechanics increasingly spent all their time with line and rule, slowly forgetting, amidst the grime and steam of the new evolving capitalist order, the world of feeling. People increasingly lost their separate identity and became seen as fragments of a mere resource which could be mined and marshalled as the coal which fired the countless new steam engines that served the same masters.

And yet there was evolving amidst this tangle of self-interest and selfishness, nourished by the need to survive amidst unbelievable competition, a breed of able minded men who were the intellectual giants of their age. These were the

conceptualists who were ever innovating with flame and water; gear and piston; trench and rail. They became known as the engineers, as much for their 'gins as their ingenuity, a derivation long since lost sight of by most of their successors.

Their products were unlike the engines of war which until the late 18th century represented the finest manifestation of man's mechanical skills. This new breed of engineer, to distinguish themselves from their military counter-parts, became known as civilian, or civil, engineers. Eventually a number of the most prominent civilian engineers began, in 1818, to meet on a routine basis in the Strand at Kendel's Coffee House. In petitioning for a Charter one of their number, Thomas Tredgold, was delegated to draft a statement of the civilian engineer's purpose. He identified the most important object of the new profession in January 1828 to be:

"*...the art of directing the great sources of power in Nature for the use and convenience of man; ...(and thus)...to improve the means of production and of traffic in states, both for internal and external trade..*"

This inspired definition translates today into the quintessence of the new quality movement and was doubtless influenced by Tredgold's colleagues search, over much coffee, for the philosophical framework essential to the wise guidance of their work. They realised their responsibility to ensure their lines and rules respected feeling as well as had meaning - a point made very clearly from across the Atlantic 29 years later by the railway engineer A M Wellington:

"*It would be well if engineering were less generally thought of, and even defined, as the art of constructing. In a certain important sense it is rather the art of not-constructing; or, to define it rudely, but not inaptly, it is the art of doing well with one dollar, (that) which any bungler can do with two after a fashion.*"

This early recognition of the importance of the wise and careful use of resources became one of the most vital distinguishing marks of the engineer, reinforced by careful research and development on how better to work with materials and the natural order. Strangely man rarely became the subject of attention in this respect and so engineers, by default, developed a laissez faire approach to management development, as did the rest of industry. Accordingly, the last - and most powerful - resource available for progressing the 'art of doing well', none other than man himself, was essentially ignored until the latter part of the 20th Century.

Not that efforts were not made to alert the early engineers to the opportunities. Most notably the Welsh philanthropist Robert Owen (1771-1858), who was, with little question, considered as the best and most successful cotton spinner in Great Britain in the early part of the 19th Century with his remarkably successful management of the New Lanark Mills.

His concern for his workers, some 25% of whom were children, aged five to six, from the poorhouses of Edinburgh and Glasgow, was exceptional for the time. Not based on any religious principles, his credo was of his own making. Remarkably, in view of more recent thinking, to be described later, Owen's philosophy centred on the twin propositions that man's character is generally formed by events over which he has little or no control and that he is not a suitable subject for praise or blame. Accordingly it is absolutely essential to ensure that individuals are placed under proper influences from the outset so as to avoid the damaging effect of irresponsible superiors.

In 1813 he outlined his view of the superior importance of people by comparison to the machines which lacked man's vital spark when he wrote:

"*If then the care as to the state of your inanimate machines can produce such beneficial results, what may not be expected if you devote equal attention to your vital machines, which are far more wonderfully constructed.*"

In the same way that toward the end of his life he increasingly found the Establishment, in its many guises, diminishing the purity of his humanitarian efforts so those same entrenched sources of wealth and influence were to inhibit the liberation of individual ability for almost the whole of the next 175 years.

THE GROWTH OF COMMUNICATIONS AND COMPETITION

As stage coaches gave way to canals (firstly in France with the magnificent Canal du Midi, completed in 1681) and then successively railways, roads, motorways and airlines took on the role of the primary means of communication so the scale and ease of the movement of goods and services expanded as did their related markets. With increased consumer demand came increased supplier competition. But producers, so long contented with regulating supply for their own best interest and convenience, were slow in waking up to the demands of serving their traditional customers better than their new, more distant, companions in trade.

As competition increased so the suppliers of services and products had to better understand the nature of their business. The competitive arena steadily enlarged from villages to towns, from towns to counties, from counties to nations and from nations to continents. At each stage the manufacturers and suppliers became more exposed to competition while survival (let alone prosperity) was less assured than ever before.

In as much as the demands of competition are clearly defined as better value for money; faster supply; higher reliability; new and superior features; better maintainability; longer life and greater durability within the operating

environment so the generic issue of variation which affects all these aspects has to be identified, understood and mastered. A failure to understand the pivotal, and negative, role of variation in any business is akin to ignoring the importance of cash flow.

It was the inventor of the cotton 'gin, Eli Whitney (1765-1825), who first came to terms with the practical problems of variation. Contracted by the American military in 1798 to produce 10,000 muskets in two years he devised a method of production based upon the use of jigs which enabled him to employ unskilled labour to produce interchangeable parts for the first time ever. To demonstrate the quality of his muskets he delivered the first trial consignment to the government in broken-down form. He then selected components at random and assembled a perfectly functioning musket. In 1812 he received a further order for 15,000 muskets. Increased quality through reduced variation had, for the first time, been demonstrated on a commercially competitive scale. And to ultimate good effect - a larger repeat order!

At the same time as Whitney was producing his advanced muskets a Frenchman (by birth, though American by adoption) set up in business in England to mass produce a range of standardised ships' blocks by the use of specially designed machines that so reduced the variation that unit costs fell and serviceability rose. These twin effects brought immense savings to the Royal Navy as it defended the homeland from Napoleon's attentions. This block maker, and former chief engineer of New York, Marc Isambard Brunel (1769-1849), went on, with his son Isambard, to undertake many of the greatest developments in civil engineering in the first half of the 19th Century.

This early recognition of variation as a source of inefficiency and waste made slow but sustained progress through the 19th Century but was rarely, if ever, considered of any more importance by the shareholders of industry or their managers than the working conditions of their often exploited employees. Their only abiding interest was the profits generated on their behalf. This preoccupation with profit to the exclusion of any corresponding interest in process set the pattern for virtually all management example until the last quarter of this Century.

To fully appreciate the nature of the serious situation facing traditional UK management today we must dwell on this basic defect in contemporary management thinking; a defect that should come as no surprise to a nation that annually qualifies more chartered accountants than chartered engineers and where messages long ago learned and used to immensely successful effect by farmers have never been so much as seriously considered by industrialists.

The early decades of the industrial revolution saw immense riches created as if by the reflex action of burning local coal to smelt local iron ore. Little effort

was required on the part of the providers of capital, other than demanding greater application by the hard-pressed workers. Little knowledge was required to turn a profit, and even less was sought out of pure curiosity.

Correlli Barnett (1986) tells us in his depressing account of this nation's decline, The Audit of War, of the visiting French industrialist Paul Benoist who, with an engineering advisor visited England in September 1842 and reported back to his father that:

"*..vast manufacturing operations prospered under the direction of passably intelligent foremen, and by workmen taught solely by experience, not to say routine. These works prosper in this way although the managers do not at all understand the important theory involved in the processes, and from the moment they become managers they rest content giving themselves a more or less plausible explanation which thereafter they do not seek at all to probe deeper.*"

Monsieur Benoist went on to rationalise the industrial success of Britain as being solely due to the unique bounteousness of nature which prevailed nowhere else in Europe. He observed that in many areas no records were kept as to the coal consumption of
individual furnaces, such was the insignificance of its cost. It was his opinion that these same men and managers set to work in Germany or France would soon be discouraged by even the normal difficulties of daily European production.

THE IMPORTANCE OF THE TELEPHONE

It was the early telephone that, following those pioneering artifacts of high quality mass production, the musket and the rope-block, served to drive management to discover new levels of reliable performance. In the early part of this century America was pioneering the widespread use of telephony with transcontinental landlines and improving levels of reliability. Conventional handsets consisted of a few hundred pieces while the switching arrangements between handsets would account for upward of 100,000 separate, but interdependent, parts. Undreamed of complexity! Excessive failures of handsets, switching units and buried amplifiers caused by variations in manufacture could not be tolerated if public demand for reliable and instant communication at a distance was to be met.

Indeed, Western Electric aimed to so influence American public opinion with the quality of its products that the company set itself the aim of replacing the familiar expression "as alike as two peas in a pod" with "as alike as two telephones". The pioneering reliability work in telephony was carried out by Western Electric's Engineering Department first at its research laboratories in Lower Manhattan and later at those in the Hawthorne Plant. The effort followed two main lines : Inspection and Quality Control. The former rejected

defectives produced while the later minimised the sources of defective production. In due course management at Western Electric opted to abandon this parallel approach to product improvement and concentrate on quality control. (In fact, from as early as 1882 the company had refused to accept deliveries of materials without evidence of inspection by the supplier.)

Heading up this effort was a young physicist, educated at the Universities of Illinois and California, who described himself as a "hard boiled engineer". Named Walter Shewhart (1891-1967) in May 1924 he presented his concept of a production control chart which would "give at a glance the greatest amount of accurate information" about an ongoing process and how to ensure it is maintained in a state of economic control. While studying physics Shewhart had become inculcated with the concept of the " 'exactness' of physical laws" but when he become a practising engineer in 1925 with Western Electric he increasingly realised that another, fresher, concept was needed which matched more closely the real world of production and business.

With Shewhart's work it eventually became possible for people to better identify the essence of organisations from amidst the shadows of their complexity but also in the truer light which revealed where it would be best possible to apply management principles selectively so as to improve performance rather than just tamper with it. In his 1931 book on the subject, Economic Control of Quality of Manufactured Product, he encouraged his readers to ponder the subjects of psychology, philosophy and logic so as to better understand how the mind works, how the world works and how reasoning works. Here was an engineer in the round!

In May 1932 Shewhart was invited to London to present a series of papers at University College where his work received a warmer welcome than hitherto had been the case in the United States. The English response (culminating in BS 600 : Application of Statistical Methods to Industrial Standardisation and Quality Control {1935}) as much as anything else stimulated a reawakening of interest in the subject in the US.

Shewhart presented a powerful and convincing case for establishing standards of economic-quality using a statistical methodology that recognised the importance of achieving and maintaining stability in the processes of production and supply. And he showed how these standards of quality must be standards by which the consumer may judge the quality of product, and which in themselves represent the goal of the producer.

In conclusion Shewhart observed that the engineer always likes to have a goal to attain and suggests that he and his masters must have available quantitative equations related to statistical understanding to define standards of economic-quality. Shewhart also noted that in the development of productive science and the meeting of human wants there is a balance

between economic value to the consumer of a development and the cost to the producer of such a development.

And then, profoundly, Shewhart stuck at the heart of the issue which is facing all industry today, by his recognition that this very balance requires there should be:

> "*[not] so much a struggle between men, companies and nations for a limited store, where one's gain must be another's loss, as there is a co-operation in an effort to raise the standards of living of all by making use of the results of progress in pure science.*"

Walter Shewhart's contribution to the material wellbeing of countless millions of people can never be assessed. But it was he who was the first person to identify the vital importance of endlessly and knowledgeably striving to remove variation from all processes of production of goods and service, while at the same time recognising that at the human level this same understanding would inevitable favour those organisations that chose to replace win-lose competition with win-win cooperation.

THE STIMULUS OF WAR; THE PLACEBO OF VICTORY

When America entered the Second World War enormous demands were placed upon its economy to meet the surge in demand for war matériel. Industry's major problem was a lack of skilled personnel. As part of the effort to mobilise production capacity Western Electric's Bell Telephone Laboratories was contracted by the War Department to promote its new and successful quality control methods throughout America's rapidly expanding armaments industry, work which today is still in use as MIL-STD-105D.

One measure of the value of this Shewhart-led quality initiative was given by Lord Cherwell, wartime scientific adviser to Winston Churchill, when he identified it as the single most significant US contribution to the whole Allied war effort.

But with the war ended and a massive redirection of industrial capacity from war to peace the market place of the mid-forties shifted from one of national survival to one of a sellers' paradise. Rapidly the hard work and disciplines of designing quality into controlled production dissipated and the more laissez faire approach of sorting bad quality our from ad hoc production, or even shipping product regardless of quality, took over. Quantity was now the issue. Moving boxes the preoccupation. Easy profits the pyrrhic prize.

In the five years to 1950 when this run-down of quality management took place in the US so in the Far East precisely the opposite was happening. Before the war Japan's vital export markets had accepted the shoddy products

supplied. There was little competition in the Far East. Before Pearl Harbour few Japanese understood the productive strength of the US. Admiral Yamamoto who eventually commanded the attack well understood the perils of attacking America's Pacific fleet in its quest for economic expansion. As a result of his travels to the west he was able to tell a reporter in 1940 that in the event Japan was to attack America:

"*In the first six to twelve months of a war with the United States and Great Britain I will run wild and win victory after victory. But then, if the war continues after that, I have no expectation of success.*"

Admiral Yamamoto and his colleagues understood, as the Japanese High Command did not, that the progressive management techniques which they had discovered on their foreign visits in the late thirties would overwhelm the productive capacity of both Japan and Germany once war was declared by both Great Powers.

Just 50 years and two weeks later the chairman of the world's largest manufacturing company, GM, formally admitted defeat to the superior economic and manufacturing practices of the now globally dominant Japanese companies (such as Toyota, NT&T and Matsushita) and modern vertical groupings, or keiretsu, (such as Matsui, C Itoh and Mitsubishi) when he admitted that the principles of mass production had now to be abandonned. Bob Stempel explained:

"*We've accepted the need for a smaller base on which to become profitable, in an increasingly lean and responsive manner.*"

At the same time as this epitome of late twentieth century corporate leadership announced the traditional sacrifices which accompany all such strategic re-organisations of western companies. In this case it was to be 74,000 jobs and literally hundreds of thousands of dependent livelihoods, as no less than 21 factories were identified for closure over the next four years. The Japanese surrender aboard the USS Missouri on 2 September 1945 had only marked the end of military hostilities. Before this, in mid-August 1945, secret discussions were taking place at ministerial level in Tokyo about a recovery strategy that would, in the words of the Foreign Minister Shigeru Yoshida, ensure that:

"*we could indeed rebuild Imperial Japan out of this way of defeat.....science will be advanced, business will become strong with the introduction of American capital, and in the end our Imperial country will be able to fulfil its true potential. If that is so, it is not so bad to be defeated in this war.*"

With General MacArthur's acceptance of Japan's surrender the need to enable the defeated peoples of Japan to support themselves at a time when the occupation powers had removed the 1,500 or so top managers of the powerful

traditional zaibatsu (vertical groupings) of industry (by imprisonment or enforced retirement) it was necessary for the middle managers to take over and rebuild their companies along new, more efficient, lines. But management training was non-existent in the years immediately following the end of the war.

An American electronics engineer, Homer Sarasohn, in his late twenties and fresh from wartime service with MIT Radiation Labs and Raytheon (where he had distinguished himself in rapidly converting experimental electronic equipment into production-line ready hardware) found himself in Tokyo in 1946 charged with establishing a radio receiver industry so that the occupation powers could broadcast to the Japanese people.

By the end of the forties his efforts had so impressed Gen MacArthur that he supported Mr Sarasohn's recommendation that, together with another engineer Charles Protzman, they set up a university level management training programme so as to spread their experience further into Japan's slowly reviving economy. This course drew upon the work of Shewhart in ensuring that only reliable and successful products were produced. Thus did two young, but insightful, engineers shape the early course of post-war economic history by passing on simply and clearly what they had been taught during the war by the Western Electric training programme. Little did they realise that their colleagues at home had opted for the easier way of management which ignored the facts and emphasised the financial fictions that were to slowly destroy American economic supremacy over the next five decades.

PART TWO – KNOWLEDGE
The Fabric of Understanding

THE FIGHT FOR PROFIT

During the morning of Thursday 25 January, 1912, in Washington DC, a witness testifying at Hearings before the Social Committee of the House of Representatives investigating Systems of Management said:

" I think it is safe to say that in the past a great part of the thought and interest both of the management and the workmen in manufacturing establishments has been centred upon the proper division of the surplus resulting from their joint efforts. The management have been looking for as large a profit as possible, and the workmen have been looking for as large wages as possible."

The expert witness went on to explain that the surplus was the balance of the selling price and the non-payroll costs associated with the manufacture of the article sold. From the surplus would come both the workmen's wages and the management's profit. He pointed out that the division of this surplus has generally been the source of most trouble between management and labour. He went on:

"Frequently, when the management have found the selling price going down they have turned toward a cut in wages - toward reducing the workman's share of the surplus - as their way of preserving their profits intact....Gradually the two sides have come to look upon one another as antagonists, and at times even as enemies - pulling apart and matching the strength of the one against the strength of the other."

Our witness, none other than Mr Frederick Winslow Taylor of Chestnut Hill, Philadelphia, the founder of what was popularly then known as `scientific management' continued to explain the essence of his approach to management to the committee Chairman thus:

"The great revolution that takes place in the mental attitude of the two parties under scientific management is that both sides take their eyes off of the division of the surplus as the all-important matter, and together turn their attention toward increasing the size of the surplus until this surplus becomes so large that it is unnecessary to quarrel over how it is divided. They come to see that when they stop pulling against one another, and instead both turn and push shoulder to shoulder in the same direction, the size of the surplus created by their joint efforts is truly astounding. They both realize that when they substitute friendly co-operation and mutual helpfulness for antagonism and strife they are together able to make this

surplus so enormously greater than it was in the past that there is ample room for a large increase in wages for the workmen and an equally great increase in profits for the manufacturer."

Eighty years later the picture is less changed than the more optimistic of observers in that Washington committee room would have imagined at the time. Taylor's methods today have been diminished by time and imperfect understanding and are no longer considered. New guru's have been found and new packaged solutions prepared. Few have actually addressed the real issue, so ably mastered by a nation so thoroughly destroyed by the second World War.

PROFITING FROM QUALITY

Profit is clearly the prime measure of success of any organisation operating in any open market. The preparedness of customers to pay in excess of cost must be the acid test for any supplier. Profit thus becomes the legitimate yardstick against which to measure the endeavours of any manager in business as he strives to please customers by meeting, even exceeding, their needs.

Profit, of course, is not the only parameter within the complex equation which defines human happiness and which must guide the thinking of engineers and managers alike (many engineers are managers; few managers are engineers). There are other less tangible parameters against which managements' efforts must be measured, such as quality, contentment, understanding and knowledge, but profit is the most broadly accepted and therefore most universally useful.

But what is profit? Just the surplus to total cost plus total payroll? Or is it a selling-price premium? It depends upon one's point of view. Profit may be seen in two ways. Firstly, it can be the margin by which the grand total cost of supply differs from the market price. Or it can be seen as the margin between the market price and the lowest possible cost of supply. In the first case profit is the seller's margin; in the second it is the buyer's margin.

Imagine three companies making mousetraps to supply the market need. The traps all sell for a well known price. They have become a commodity. Each of the firms makes a good return on its long written-off investment. They each have roughly one third of the total available sales. The supply of mice continues unabated!

Firm A is very happy with the status quo. Not a lot of vision. Firm B thinks it can gain a premium for its designer-painted standard-type traps by advertising, marketing and branding. Firm C, determined to take market share from its competitors as it plans to move up-market into higher added-value products, such as fly sprays, decides to re-engineer the mousetrap to

make it easier (and safer) to use and cheaper to produce by cutting out waste, eliminating rework and dispensing with inefficiencies in sales, distribution, billing and administration.

Over the following months Firm A miss-identifies a downturn in sales as just `seasonal variation'; Firm B sees a pick-up in sales due to novelty and believes its marketing strategy is working well and will go on doing so. Meanwhile Firm C prepares to cut the price of its improved traps by a proportion of the total savings it is beginning to make from running its business better.

The price cuts introduced by Firm C exceed the profit margins of either Firms A or B. Firm B is already struggling with its extra marketing and designer costs so its margin is thinner than Firm A's. First Firm B, and then Firm A, totter to the brink of bankruptcy while the word spreads that Firm C produces the best mousetraps ever. Its only challenge now is meeting the rapidly increased demand. If for mousetraps we read motor cars we can readily identify the contemporary example of this tale which unfolds steadily and predictable before us.

THE QUALITY REVOLUTION

The word quality, in its widest sense, is linguistically classed as a primitive. It is like beauty, love, delight. It cannot be defined further. It is an individual emotion, not a generally agreed standard or definition which can be precisely, though arbitrarily, defined such as fast (70 mph); tall (2m); heavy (220 lb); hot (40 deg C) or unending (5 hr).

Beauty is said to be in the eye of the beholder. Quality may be said to be in the judgement of the customer. Quality, contrary to a popular misconception rooted in the origins of ISO 9000, is not the same as conformity to traditional specifications. No supplier's claim to be a quality company should impress, only customers' claims should be respected.

During the past 15 years the writer has found no better definition of quality than:

"*The quality of goods or services is what delights the customer - by satisfying every related aspect of a fully specified requirement.*"

Full specifications rarely exist in the customer's mind since s/he often knows far less than nowadays needed to be able to spell out in total detail what their actual needs are and will be in the lifetime of the good or service supplied. Suppliers can have such knowledge from their research and thus provide delight.

As long ago as 1624 Sir Henry Wotton writing on the elements of architecture defined the "conditions of well building" both in architecture and in all "other operative arts" as that famous trinity of commodity, firmness and delight. Over three-and-a-half centuries later managers intent on World-class performance will be well advised to remember Sir Henry's prescription for product quality.

Delighted customers tell others of their experience and are loath to change suppliers. Since different people have different thresholds of delight it follows that differing standards of goods and services can be perceived as being of good quality to different customers. Thus a Rover Metro can provide thousands of people in middle-income families with delight, just as a Bentley will similarly delight the much smaller number of people who have more than usual levels of disposable income. The two cars are of vastly different standard, grade or even calibre, but are of similar quality in the judgement of their owners. Each make of car performs reliably; they are each well finished; they meet or exceed their owner's expectations; they have the necessary comforts and an increasing range of additional features. Commodity, firmness and delight in proportionate measures to their respective and different owners.

One of the more successful companies at the turn of the century in New York was The Buggy Whip Co. It made the best whips in town. They sold well. A true quality product of which the owner could be proud. The company however went bankrupt within months of the Ford Model T being launched in 1908. The Buggy Whip Co. had failed to innovate within its product range to take account of the horse's newly arrived mechanical competitor. Acclaimed quality products alone could not save the company.

A not dissimilar tale could be told of countless candle makers who rapidly went out of business following Thomas Edison's demonstration of his first electric light on October 21, 1879. Following many such public demonstrations in the ensuing months interest in such convenient lighting spread so rapidly that within a few years it actually became more expensive to rely on candles than electric light as a source of illumination. And yet no one buying candles at their corner store in the summer of 1879 ever asked when the shopkeeper expected to stock electric light bulbs! The candle makers had failed to research new and better sources of light. New, quality products are rarely specified by customers.

THE MANAGEMENT OF QUALITY

The management of quality is made the more difficult because it is initially perceived as a short cut to success. Once the euphoria of the exciting early days of a quality initiative has passed interest wanes and progress slows. It

may even disappear. Most organisations go through identifiable phases in the management of quality. The first phase is self-recognition of the importance of quality by individual managers who discern the benefits of using quality products themselves as customers. This is the personal phase. It works for me!

Awareness of the heavily promoted ISO 9000 approach to "quality systems" reinforced by the changing demands of customers seeing the Standard as a pre-requisite for bidding for business then focuses top management thinking and the marketing imperative takes over. This is the survival phase. It will hold market share! With a superficial understanding of ISO 9000 and all that it promises it is not long before TQM is identified as the real prize by top management always searching for ways to reach new levels of profitability. This is the future prosperity phase. It will solve all our problems!

With ISO 9000, TQM and, even more recently BPR, on the Board agenda top management then sets in train a spasm of spending and advanced lip-service presentations in exotic surroundings to tell everyone about their new breakthrough in understanding; they appoint special quality managers and they urge everyone in the business to do a better job and come up with better ideas for change!

In three splendidly simple steps they seal the fate of their very own quality initiative by a failure to understand what the management of quality is about. It is not about razzmatazz! It is not about delegating quality management outside the Boardroom to one person! It is not about exhortations to do better and think smarter!

What the management of quality is about is every member of the Board understanding the new philosophy, sharing a commitment to it and moving the initiative outside the Boardroom by sustained example. There is no place for cheerleaders!

What it is about is getting every manager and, in due course, every employee to realize that quality is their business. No internal customer can manage any other internal supplier's quality. There is no place for prima donnas! Not every one in the orchestra can play the solo; neither can every member of the team score the winning goal.

What it is about is getting people to think process rather than results; to think scientifically rather than emotionally; to act in co-operation rather than in confrontation and to seek optimisation in place of sub-optimisation.

What it is about is people, dedication and mutual respect. The closer a company's organisational structure moves towards respecting the equality of interests of all its stakeholder the closer that company will come to reaching World-class quality in the eyes of its customers.

WHAT CAN A MANAGER DO TODAY TO MAKE A START?

Most so called quality initiatives founder early on because the target audience sees no way of immediately doing anything to contribute to the call for change from those at, or near, the top of the organisation. Early enthusiasm, so easily engendered, soon gives way to cynicism if not sustained by able leaders. But this need not be the case. Even with initiatives that start hesitantly there is something that all managers can do to make an immediate start and which can do nothing but good for the organisation regardless of whatever happens thereafter.

Immediately following the razzmatazz of the initiative's launch every manager should be introduced to the simple procedure known as process mapping or deployment flowcharting, whereby he can track the detail of all those processes over which s/he has responsibility and for which s/he has accountability. The procedure soon involves the efforts of every person working for the manager. And by so doing the procedure gains its strength. The most critical observation made about the procedure is that it is very simple - so simple that many managers see it is unnecessary. In fact managers at all levels of seniority benefit from the procedure once they have overcome their various emotional reservations. The procedure is as follows:

1. Make a start by identifying, by title, those most important company processes for which the manager alone is solely responsible to a superior.

The process may be the production of goods; the preparation of a material; the supply of a service; the provision of technical advice; the generation of information or the co-ordination of a set of major business processes within a project.

2. Next, list inputs and outputs relating to each of the processes identified and also list the key characters involved in each process.

Depending upon the nature of the process the characters may be other managers or supervisors or operators. But in every case the person identified by name or title will be the person most directly responsible for that part of the process. It could be the director responsible for sign-off or the clerk responsible for issuing the order number.

3. Now, draft map the flow of the tasks within each process (as they exist now) and at each step ensure that the person responsible for each task is clearly identified.

This exercise, carried out alone by the manager, will reveal how much s/he actually understands about the total process and demonstrate the vital importance of the next step.

4. Meet with every person in the cast of characters and explain that they need to come together to help you (the manager) better understand the details of the process to which they are an integral and vital part.

Some resistance may be met at this stage unless there is a reasonable level of trust between the manager and his sub-ordinates. Once trust is established (and here the manager must trust his superiors) then the process team comes together for the first time to really share an understanding of how they each contribute to doing the work they are paid for.

5. Prepare a fresh draft of the process map - various flowcharting techniques exist which can be used to help with orderly mapping of the process - and then return it to the process team and gain confirmation of their ownership of the map.

By this stage a degree of unusual enthusiasm has built up within the team and fresh ideas pop up. Remember the challenge is to map the process as it is now, not as it could be or how it used to be. It is very important to learn to walk first!

6. With sign-off from everyone involved in the processes you can talk with colleagues about their processes being mapped, especially those processes which supply you, or those which you supply to others.

As the manager of the process you will now have a valuable, living document that is easily understood by all. It is not a boring and bureaucratic manual of dozens of pages of close-spaced type which is open to interpretation and disagreement.

ADVANTAGES OF MAPPING YOUR PROCESSES

The operational and organisational advantages which flow from mapping processes are numerous and more potentially useful than may initially be imagined. They are, in no significant order:

1. A unique statement of the process clearly set down on a minimum of pages and in an user-friendly manner.

2. Ownership of each step in the process is clear and precise.

3. The process map presentation is concise and authoritative and encourages regular use rather than local `archiving'.

4. The process map serves as a basis for process-induction and training of new staff.

5. The process map serves as a starting point for improving the process by rationalisation and/or simplification.

6. A manager's performance over a period of time will be reflected in how the mapped processes under his control change and improve through formal revision.

7. A manager will be better able to follow the progress of his sub-ordinates and help their development within the business.

8. The process maps do not conflict with, rather they reinforce, the requirements of ISO 9000 as well as efforts to achieve an interpretation of `total quality management'.

9. The procedure of process mapping removes barriers between people both departmentally and hierarchically and accordingly employees at all `levels' begin to discover pride and joy in their daily work.

AN EXAMPLE OF HOW PROCESS MAPPING IMPROVED PERFORMANCE

Top management in a successful processing company was concerned with its trade debtors running near to six weeks instead of the preferred 3.5 weeks. The accountants had been unable to reduce the time interval and credit control was overloaded with handling dozens of claims that were coming in from the company's customers. There appeared to be a log jam and no one knew which logs to spike underwater to bring about the wanted movement leading onto change.

It was decided to gain a better understanding of the debtors account by mapping the process in full detail. The appropriate people from sales, accounts, credit control, warehouse and distribution were introduced to the technique and each talked through their part of the process. Draft maps were drawn up using traditional flow chart symbols to an agreed convention.

A picture emerged that the problem did not rest with customer performance or with accounts, though a number of improvements were identified during the mapping procedure. The main source of problems was soon identified as being in the warehouse order picking and pallet assembly areas. It was a department based on custom and practice where worker trained worker. Such written documents as existed were never sought out, they had a reputation for being boring and, years after they were first written, they were out of date.

It was decided to introduce the mapping process to the warehouse manager so that he could work with his small team to see if improvements were possible. However, their first task was to map the existing process. Everyone involved in the warehouse took part in the procedure. It revealed many anomalies.

The warehouse was shipping out some 45,000 boxes per week and records showed a steady error rate of some 185 wrong boxes per week - equivalent to about a 0.41% (or 4,100 ppm) error rate. Since the company only supplied a small number of key retailers and each had a relatively small number of large central distribution depots the number of bills issued each week was small in number - typically 15 or so of about £100,000 each. But just one box error in a delivery would delay payment of a large sum for a long time as corrective paperwork slowly filed through credit control.

The task was clear: to radically reduce box errors in the first place and thereby improve customer service as well as reduce credit control to a minor process, thus freeing resources for other more productive activity within accounts administration.

Process mapping of the warehouse operation took an elapsed time of less than six weeks, including learning time for all involved. As operators for the first time began to share an understanding of how their department worked they soon were able to tell their manager of opportunities for improvement. With a fully agreed and mapped statement (Issue 1) of how the warehouse process worked the manager then started with his colleagues to identify improvements.

While the improvement process was underway with a view to revising the mapping to form Issue 2 the more consistent way of working with Issue 1 itself led to a reduction in errors. Over a period of 24 weeks the error rate dropped to 0.12% (or 1,220 ppm) simply by the introduction of a universally agreed method of working throughout the warehouse.

With the introduction of Issue 2 procedures the error rate began to fall further and one year later, with the manager and team still pursuing their own continuous improvement programme the error rate has settled down to a steady 260 ppm - better than a 20-fold improvement in performance over a year and a half.

IN CONCLUSION

Few businesses have mastered the progressive management of quality that is essential to their survival. Few business leaders have taken the trouble to fully

understand the issues which are of central importance to the success of their corporate charge in the medium to long term.

Engineers, of whatever original persuasion, have by virtue of their systems and resources based education and training a valuable viewpoint from which to contribute towards the management of quality.

Eighty years ago the originator of scientific management, Frederick Taylor, summarised its essentials as:

1. Science, not rule of thumb;
2. Harmony, not discord;
3. Co-operation, not confrontation; and,
4. Maximum output in place of restricted output.

Today, following the major contributions to scientific, or progressive, management by Walter Shewhart and Edwards Deming the same four tenets stand, with only the title of the fourth now reading `Optimisation of whole rather than selfishness by parts', and thus reflecting more precisely the importance of an understanding of the system and variation.

Engineers have long lived with the acronym KISS on their notice boards, if not on their minds. It simply echoes A M Wellington's 1857 statement about doing with one dollar what any bungler can do for two. But there is a still deeper concept to simplicity that it bodes engineering managers to remember as they strive to master the management of quality.

It is beautifully contained in an observation attributed to the Boston jurist Oliver Wendell Holmes (1841-1935) who stated:

"*I would not give a fig for the simplicity this side of complexity, but I would give my life for the simplicity on the other side of complexity.*"

The history of engineering is firmly rooted in the discovery of passes leading to the plains of long-term simplicity beyond the mountain ranges of organisational, bureaucratic and inter-professional complexity that stand in the way of all human progress and endeavour. Engineers intending to contribute to the management of quality must help others understand how to overcome complexity and discover their way to the new simplicity.

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COMMENTS

From Col. Jack Crawford:

May I offer a suggestion? The Americans always think history began 200 years ago. So they make claims such as Eli Whitney being the first to invent interchangeable components and the concept of configuration management. My understanding is that the idea was first applied to muskets by a French gunsmith, and was brought from France to the USA by Thomas Jefferson. All of those people were centuries behind the masters of the Venetian Arsenal with their techniques of warship building and crossbow manufacture. According to the historian F C Lane, the Venetian system of stored, prefabricated, interchangeable assemblies and components enabled them to turn out 100 galleys within two months when they were threatened with the war which they eventually won at Lepanto.

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