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Continuous Improvement in Business Process Re-Engineering & Six Sigma

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Continuous Improvement in Business Process Re-Engineering & Six Sigma

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I. Introduction

One of this nation's most famous attempts to re-engineer a vital process took place in 1855. The place was HMG's Board of Ordnance Armoury at Enfield in Middlesex. Enfield Armoury had been founded in 1813 by the government after two decades of exploitation by assorted private armouries centred in Birmingham and, to a lesser degree, London.

It had been decided by the Board of Ordnance that the only way to secure value for money in the procurement of small arms was to take over the production process itself.

At the end of 1815 production began at Enfield, just as England was entering a period of peace following 22 years of war in Europe and three in America. Accordingly, the armoury was promptly retired for maintenance and storage duties!

During the French wars, the Ordnance-Department had instituted 100% inspection because of inferior workmanship. In so doing it assumed the responsibility for assembly of finished muskets by contracting with another firm for that work. The logical next step, particularly since it was increasingly receiving unacceptable offers for the manufacture of the various components of an improved design of muskets (the Minié), was to expand the Enfield Armoury into a full manufacturing centre. Work began in the spring of 1855 with preliminary production trials taking place in 1857. For the first time interchangeable manufacture, long since practised in America under the leadership of Alfred C Hobbs (locksmith) and Samuel Colt (gunsmith), was established in England. Enfield Armoury became a national benchmark for advance production techniques. No longer was the manufacturing process divided into specialist material makers and a similar number of even more specialised 'setters-up' or 'fitters'. Because of the practice of universal inter changeability production became a relatively seamless flow-line from selected raw materials to reliable end products. The process had been re-engineered and productivity and reliability significantly improved. The endless shaping, filing, smoothing, polishing and adjustments necessary to complete a musket in the mid-1850's gave way to the calm, ordered assembly of the new Minié musket from finished component parts selected at random. As Henry Ford was to say some 50 years later writing in the Encyclopædia Britannica on the subject of modern manufacturing techniques for motor cars: "*In mass production there are no fitters*. " At Enfield the process of rifle production had with much difficulty been re-engineered along American lines as a result of the chronic pressures of war on three continents (Europe, North America and India). Now, 140 years later new chronic pressures - this time of an economic rather than a military nature - are building to invite as radical a change to our way of doing business as the step change from the craft production to the mass production had on the making of muskets and rifles. Quite often it is necessary for an organization to revise and re-examine it's decisions, goals, targets etc., in order to improve the performance in many ways and this activity of re-engineering is called as Business Process Re-engineering which is also known as Business Process Re-design or Business Process Improvement.

II. Philosophy

This talk was invited to provide a keynote to the day's discussions about improved business efficiency and the new corporate entities that are needed to achieve sustainable economic-quality. Respecting, as I

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do, the primary importance of operational definitions I would suggest we reflect upon the meaning of the word 'keynote' - a term taken from the world of music. (We are well advised, I maintain, to respect the precedent of music since I am not alone in claiming that the symphony orchestra is the finest model available on which we can base our vision for the new corporate entity - one obsessed with harmony and teamwork.) In music a keynote is the primary note of the fundamental scale from which the musical composition is 'factured' or made. Thus in a keynote presentation we might reasonably expect there to be a primary marker of the fundamental theme from which all subsequent improvement in 'facture' can be derived. Our fundamental theme is business process improvement or re-engineering. It matters not what we make - be it buildings or bankers drafts; mint creams or mortgages; vehicles or virtual reality. I give you my keynote as 'sigma' - the primary symbol of the fundamental theme which paces all progress. I speak of the basic statistical measure of deviation from target. So long as we confine ourselves to the realm of the natural world we may say with absolute confidence that "*Nature operates in cycles and systems, not by chance and incident*" This is my First Axiom. My Second is: "*Nature decrees variation in all things*".

I recommend that you will accept these statements, rooted as they are in the primacy of natural material science or knowledge, and upon which mankind is as ultimately dependent as any other aspect of the universe. Since the purpose of all business (I would prefer that we now equate commercial activity with the word 'carefulness' rather than 'busy-ness' for reasons which will become apparent shortly) is the facturing of products and services I strongly recommend an understanding of variation if sustained and substantial improvement is sought. Note however that "*Variation is both a virus which destroys order as well as the source of catalytic variety which ensures survival through evolution.*" (Third Axiom). And so let's end this section on philosophy with a statement, partly self-evident, that is rarely acknowledged in business circles "We cannot know what we do not know, and we can only learn from others by invitation." (Fourth Axiom). Note the open minded emphasis and the vital importance of invitation.

III. Concepts

The key concept is and always has been one of knowledge - scientia potestas est as the Romans well knew. However when the love of money and the mirage of power that follows becomes the focus of human effort, as it has in the west since the mid-fifties, then knowledge gets overlooked - worse even, forgotten. For knowledge to flourish there must be respect for theory, since without theory there can be no prediction and without prediction there can be no sound and lasting improvement. After all the job of management is fundamentally one of prediction - not hoping for the best! The eminent British philosopher Karl Popper reminds us that the primal activity of life is problem solving. And the primal problem is survival. "All organisms are constantly, day and night, engaged in problem-solving; and so are all those evolutionary sequences of organisms - the phyla which begin with the most primitive forms and of which the now living organisms are the latest members." Of course the "latest" living organisms conventionally comprise the human species. Until the last war it was powerful individuals who dominated socio-technical development and stood at the top of the organic pile. Today that summit position is increasingly becoming a plateau rather than a peak and the topmost position will increasingly be occupied by those networks and organisations of individuals who can, by their combined efforts, operate dominantly on the global stage. It is therefore a case of the organisation seen as an organism rather than as a machine. My Fifth Axiom reflects the natural imperative of our long biological development: "We best understand those things we can do ourselves; to shape our practice with theory magnifies our capabilities. Co-operation leads to unimagined synergies while confrontation only proliferates entropy." In other words we must all stay in touch with reality - I suggest that the progressive loss of tactile skills is one of the major contributors to our decline. For countless centuries man has programmed his brain through his hands; it would be odd if we suddenly could dispence with this dextrous skill at no penalty to our intellectual development and rely on the view of the computer screen. Now business process improvement focuses, by definition, on process in contrast to function and in so doing avoids hierarchy in favour of heterarchy. The emphasis is on connectivities rather than entities. It is to do with the weft rather than the warp of an organisation's fabric. It is this great vector shift from instruction to information which is taking place in all western businesses that are struggling for survival. Today centralised command and control is being replaced by local autonomy; confrontation is being replaced by co-operation; the boss is deferring to the customer as being the employee's most important consideration. Process oriented management is even beginning to replace financially oriented management in various enlightened organisations.

But all these changes are but reflections of a more fundamental paradigm, or pattern, shift. That change is the move away from reductionist thinking in favour of holistic thinking - the imperative to "*Only connect...*" in the words of E M Forster. The eighties produced ample evidence to show how our nation's decline has been management led. The nineties continued to rout as rank financial dishonesty

overwhelmed the efforts of incompetent managers. And throughout an overwhelming truth prevailed where it mattered - amongst the vital majority that is "*No one willingly goes to work to do a bad job or produce faulty work.*" (Sixth Axiom). And no one ever has. But many a time people have found arbitrary barriers placed in their way, by their superiors, that have literally prevented them from doing good work or required them to do dishonest work. The organic emphasis in business management increasingly rests on thinking in systems rather than structures; working on processes rather than puzzling over ill defined problems. Going - albeit slowly - are the days of macho-management, fire fighting and free-wheeling - the era of busy-ness, 'hard'-work and easy windfall profits. Coming-equally slowly - are the days of leadership, never-ending improvement and coaching - the era of carefulness, 'smart'-work and sustained profits.

The re-inforcing concepts which have led to the deep understand standing of the superior characteristics of process oriented management were all set down from the 1920's by such writers as Broad, Smuts, Woodger and Bertalanffy in their treatises on biological systems and the fundamental principles or organisation in the natural world. Similarly Norbert Wiener, investigating the problem of shooting down fast moving aircraft in the man-made horrors of WW2 developed his pioneering theories about cybernetics and control which are now seen to have universal application. The single biggest contribution to process management however came from a quiet spoken, "*hard boiled engineer*" at Bell Laboratories by the name of Walter Shewhart. Shewhart had been charged with devising a method whereby his superiors could take confidence that telephone components coming off the production lines at Western Electric's Hawthorne plant outside Chicago could be relied upon to be consistent in operation and durability. In May 1924 he reported with an elegant and simple solution to their problem - it was a simple technique to chart his natural process performance or behaviour - better known as 'the control chart'. The chart reveals the signature of the process and also can, with competent interpretation reveal, in real time, the beginning of any significant problem arising within the process. Instead of a day's production being rejected by 100% end-of-line inspection it was suddenly possible to monitor performance on the line by the operator as it happened and ensure that nothing was made that did not conform to the stated requirement. Thus the concepts that are central to facturing consistent, reliable and economic products and services are founded on knowledge developed around the late 1920's. A body of theory was now able to rigorously explain why the practice of interchangeability developed by American armament manufacturers in the early 1800's was so successful wherever and by whoever it was adopted.

IV. Implications

The implications of the foregoing are profound and they explain why failure attends the majority of quality management initiatives which have been established without the deep understanding of natural-systems behaviour and variation. (The widespread use - but narrow application - of the word "*system*" by the IT community suggests perhaps that we should, in the wider holistic sense, emphasise the importance of "*natural systems*" thinking.)

We can summarise the capital concepts that are vitally important to the new-style of process oriented management by contrasting them with the old-style financially oriented concepts of business, thus:

PEOPLE processes v Autocratic bureaucracy

A theory of KNOWLEDGE v Rule-of-thumb and tampering

A SYSTEMS based approach to thinking v A piecemeal reaction to emotion

Understanding VARIATION v Massaging visible financial numbers

Each of these four capital facets interlocks with the other three, thus forming a robust jigsaw when imagined in two dimensions or, better still imagined in three dimensions, a triangular pyramid. We call this exemplary triangular pyramid a Tetrad (a grouping of four related aspects) as it manifests the systemic integrity of the holistic approach to management. The implications of these concepts are significant and important. Since the world has irrevocably shifted from the seller's market place of the sixties to the buyer's marketplace of today (and the foreseeable future) the customer now dominates and suppliers have to face increasing competition. Quality may be the fashionable catchword of the management marketplace but the principles of world class economic customer-preference enshrined within the above are rarely evidenced in popular usage. Let me now demonstrate why, in view of the foregoing, I predict the failure of the majority of business process inprovement or re-engineering initiatives that ignore the foregoing. The target aim of any business must be world class performance, a concept casually used in the context of marketing but one rarely understood operationally as "on target with minimum variation", as specified in 1960 by the Japanese statistician Genichi Taguchi. The measurement of this variation from aim ideally should be independent of the supplier and as experienced by the customer. One test would be product or service failure rates where a failure is defined as any incident or event that disappoints the customer - regardless as to whether it is reasonable. (After all advertising can be misleading!) In the old economic era (pre-1970) failure rates were thought of generally as being tolerable so long as they measured in decimals of a percentage. Today, for success, customers will not for long tolerate

low percentage failure rates, expecting rather rates best expressed in values of less than 100 parts per million. Namely many orders of magnitude smaller. When we recall that one per cent is equivalent to 10,000 ppm the size of the step change becomes apparent. (It is convenient to remember that 100 ppm = 1/100 of 1%). Let us take just 0.1 percent (or 1,000 customer disappointments per million experiences) as the status-quo level of performance today for a company that believes it is doing all the right things, i.e. it has got ISO9000 and/or similar! Depending upon attitudes towards continuous improvement - kaizen - such a company may be seen as developing along a characteristic kaizen trajectory. With time error rates progressively drop. A smooth continuous sequence of beneficial, or virtuous, changes lead it forward efficiently and profitably. By introducing pro-forma business process re-engineering the aim appears to be to achieve a step change that will boost performance either with new processes and/or new products. The hype surrounding this and related new management fad (such as 6- Sigma) certainly can be seen to offer casual observers the promise of an instant pudding solution to their meal-ticket problem. Imagine how Company A can make a short-lived gain by such implementations as BPR and 6-Sigma, but in the absence of a significant kaizen profile, will be overhauled by a steadily improving competitor, Company B. Company B simply out-performs Company A with its more determined kaizen profile and without sole relianace on the strict, reductionist methodology of the package approach. The point I wish to make is this - without kaizen BPR and 6-Sigma will simply be a step change to nowhere very special after a brief period of top-management, fad-driven excitement has passed. And as with TQM before it a new fashion will have to be found to crank up the ever declining performance of the 'ignorant' organisation. Already the snake oil sale men of such potent brews as 6-sigma are on the look-out for yet another new medicine with which to at least bathe if not heal the corporate underperformers.

V. Conclusion

If we accept that world class economic-quality (that is quality for which no premium is paid by the customer) is our ambition - better, our obsession - then we need to remember and act upon Dr Genichi Taguchi's definition of "*On target with minimum variance*" It was made in the days of a seller's market. Today with the shift in market emphasis to the buyer we must remember that no longer does the seller determine the validity of the target. Today the target can only be validated by the customer. What has not changed, however, is the fact that variance still can only be minimised by the supplier. Now it is impossible to define the target, let alone achieve it, without recourse to systems thinking and process working. No customers will be long attracted to a target rooted in financial greed on the part of the supplier. Also, to minimise variation and constantly improve the capability of an organisation's processes is impossible without appreciating the importance of understanding natural process performance and statistical thinking.Which brings us back to our musical analogy and the keynote symbol of 'sigma'. Our coda is simple, brief and powerful. It is that all lasting improvement must be knowledge-based and rooted in established theory. No number of well expressed hopes for a better tomorrow or exhortations of "Good Luck!" can make any difference now. Tomorrow's future will be determined by people who seek deep understanding of how socio-technical systems perform within an holistic framework. Schumarker said "*Think globally; act locally*". For those of us interested in economic quality, by whatever route (and under whatever acronym), the best recommendation is that contained within my Seventh Axiom with which I conclude this paper: "*Thinking in systems and working on processes, aware that knowledge and the customer are the co-equal and ultimate sources of all power in the new global marketplace, is the only way to minimise the risk of corporate failure within the next decade.*"

References Références Referencias

1. Berger, A., (1997). Continuous improvement and Kaizen: Standardizations and organizational designs, Integrated Manufacturing System, 8(2), 110-117.
2. Brunet, A. P. and New, S. (2003), Kaizen in Japan: an empirical study. International Journal of Operations & Production Management, 23(12), 1426-1446.
3. Carpinetti, L., Buosi, T., and Gerolamo, M., (2003), Quality Management and improvement. A framework and a business-process reference model. Business Process Management Journal, 9(4), 543-554.
4. Dahlgaard, J. J., and Dahlgaard-Park, S. M., (2006), Lean production, six sigma qualities, TQM and company culture. The TQM Magazine, 18 (3), 263-281.
5. Davenport, T. H., and Short, J. E., (1990). The new industrial engineering: Information technology and business process redesign. Sloan Management Review, 31(4), 11-27.
6. Davenport, T. H., (1993). Process Innovation: Reengineering work through information technology. Boston MA: Harvard Business School Press.
7. Elbo, R.A.H., (2000). Inside's Japan Kaizen Power Houses. Business World Philippines, 13, 1-2.
8. Farley, C., (1999). Despliegue de Políticas del KAIZEN. In: CINTERMEX, ed. XI Congreso Internacional de Calidad Total, noviembre 1999.

Monterrey Nuevo León México: Fundación Mexicana de la Calidad Total y Centro de Productividad de Monterrey.
9. Gondhalekar, S., Babu, S., and Godrej, N., (1995), Towards using Kaizen process dynamics: a case study, International Journal of Quality & Reliability Management, 12(9), 192-209.
10. Imai, M., (1986), Kaizen: The key to Japan's Competitive Success, NY: Random House.
11. Imal, M., (1997), GEMBA KAIZEN. A common sense, low cost approach to management. Kaizen Institute, Ltd.
12. Juran, J., (1990)., Juran y el Liderazgo para la Calidad. Un Manual para Directivos. Madrid: Editorial Díaz Santos.
13. Lillrank, P., and Kano, N., (1989). Continuous Improvement: Quality Control Circles in Japanese industries. Ann Arbor MI: University of Michigan.
14. Mintzberg, H., and Westley, F., (1992).Cycles of organizational change. Strategic Management Journal 13, 39-59.
15. Newitt, D. J., (1996). Beyond BPR & TQM - Managing through processes: Is kaizen enough? In: Proceedings Industrial Engineering, London, U.K: Institution of Electric Engineers.
16. Pettigrew, A. M. (1990). Longitudinal Field Research: Theory and Practice. Organization Science, 1(3), 267-292.
17. Robinson, A., (1991), Continuous Improvement in Operations. Cambridge, MA: Productivity Press.
18. Sheridan, J., (1997). Kaizen Blitz. Industry Week, 246(16), 19-27.
19. Tanner, C., and Roncarti, R., (1994), Kaizen leads to breakthroughs in responsiveness and the Shingo Prize at Critikon, National Productivity Review. 13(4), 517-531.
20. Van de Ven, A. H., and Poole, M. S. (1995), Explaining Developments change in organizations. Academy of Management Review, 20(3), 510-540.

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