

How United States could ensure global competitiveness for decades!

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This proposal if diligently pursued could give the United States a global competitive edge for decades to come. The proposal envisions a six sigma movement for national competitiveness. Pioneered at Motorola and popularized at General Electric by its former Chairman, Dr. John F. Welch, Jr., six sigma offers a data-driven disciplined methodology to follow for operating all repetitive activities (called work processes) in the best possible manner. Performance is measured in terms of defects, defined as all that leads to customer dissatisfaction. Six sigma processes, whether manufacturing or transactional, produce extremely few defects- 3.45 per million opportunities for a process with a single-sided specification. Since a lot of what we all do from the time we wake up to the time we go to bed, including what we do at work, is a series of repetitive work processes, six sigma really is for life and so we must all think, work, and live the six sigma way. The benefits of following six sigma are tremendous as are the catastrophic results of not following it. Success with six sigma programs has been dramatic, prompting popular periodicals such as the New York Times, Fortune, Business Week, Wall Street Journal, Chicago Tribune, and USA Today to carry full-length articles on the subject. Business Week (June 4, 2006) reported that six sigma programs are in place at 35% of US businesses and the list continues to grow. It is heartening that a major six sigma initiative is underway at the US Department of Defense. Companies embracing six sigma have reported substantial recurring profits.

The Six sigma approach, briefly summarized, is to articulate the problem that is giving rise to customer dissatisfaction, validate measurement systems, determine current performance, find the vital causes of variation, work on them to reduce defects, and monitor all variables so problems once identified and fixed, stay fixed and the progress is sustained.

While Motorola pioneered six sigma, the author has deciphered what makes six sigma possible in the fundamental sense based on natural laws that he formulated. He also advanced the state of the art of six sigma by developing new approaches to the Improve Phase designs and by extending the applicability of six sigma to dynamic and nonlinear systems. He has worked with major public sector & private-sector organizations, domestic and foreign Government departments, and universities & colleges in six sigma training programs. He is probably the first educator to introduce six sigma training in engineering and management curricula. Working with a Business School in India, the author established national six sigma excellence awards for India, Inc., in 2005.

The confidence in the ability of six sigma to tackle complex issues such as transforming higher education, reducing healthcare costs, and resolving international conflicts as well as routine manufacturing and transactional processes is due to three fundamental laws of nature:

1. The Law of Karma (India ~ 1,500 B.C.). The first natural law states *“For every effect, there must necessarily be a cause or causes”*. In the context of six sigma, this concept applies to all repetitive activities (work processes). In six sigma improvement projects, the effect is the outcome of an activity that is sought to be improved. There is customer dissatisfaction with the outcome leading to high defect levels. This law is a powerful source of comfort for anyone aspiring to improve performance knowing that there are causes impacting the outcome. If the causes could found (they are found with six sigma), we would work on them to improve performance.

2. The Law of Natural Variability (Germany, 19th Century A. D.). This law states, “*All processes and transactions exhibit a certain amount of inherent variability no matter how well they are designed*”. This variability occurs due to a number of essentially uncontrollable (and often unknown) causes and introduces a certain minimum number of defects in the outcomes of work processes. In other words, zero defects ad infinitum is not in the plan of nature. This variability often follows the normal probability distribution.

3. The Law of Assignable Causes (USA and Japan, 20th Century A.D.). The third natural law states, “*The unavoidable inherent variability depicted in (2) is worsened by causes that are discoverable. Tracing and then eliminating these causes or setting them at the correct values as appropriate will return the process or transaction to its natural state.*”.

These natural laws lead to the five-phase (Scope, Measure, Analyze, Improve, and Control), eleven-step six sigma methodology for operating all repetitive activities in the best possible manner. The eleven steps are: (1) Articulate the problem that is producing customer dissatisfaction, (2) Define outcomes – response variables, (3) set project goals, (4) Draw the process map showing all the steps in the work process, (5) Validate measurement systems so they do not contribute to defects, (6) Collect data on the response variable(s), (7) Establish the baseline – starting defect levels, so the benefits of six sigma can be properly catalogued, (8) Conduct designed experiments and collect data on the response variables and the potential causes of defects, called major impact factors, (9) Analyze the collected data to determine the major impact factors, (10) Set major impact factors at the optimal values or eliminate them as appropriate, (11) Monitor response variables so that the problems once fixed will stay fixed and the benefits are sustained.

Following the six sigma procedure will reduce defects in the outcomes to the least possible levels consistent with the natural variability present. In the vast number of processes and transactions, this would be sufficient. In some applications, lower defect levels may be called for and if so, one would have to consider design changes such as a different business model, better technology or equipment, different raw materials, etc.

Why the United States must embark on a national six sigma campaign.

Travels to numerous countries over several decades has led the author to prepare a *qualitative* plot depicting the relative positions of several nations as a function of the defects in all their products and services shown in Figure 1. This figure shows the various nations generally falling

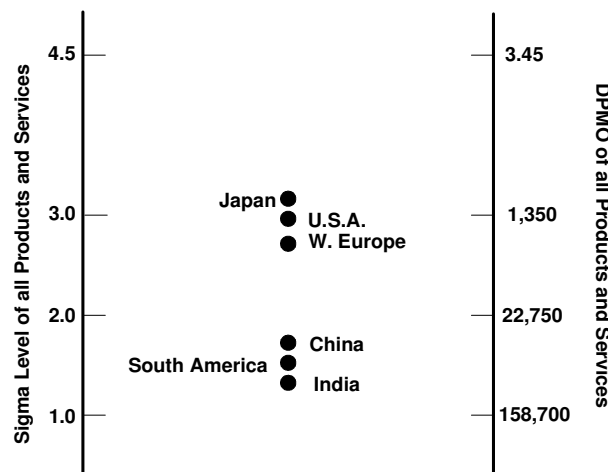


Figure 1. Defect Levels of Developed and Emerging Nations

into two categories. In the first category are developed nations characterized by low defect levels while in the second category are developing and emerging nations that are characterized by high defect levels. The location of one nation relative to others in its category or their respective defect levels may or may not be wholly correct but one thing is clear. If developing and emerging nations wish to increase GDP, alleviate poverty, and join the ranks of developed nations, they would have to drastically reduce defect levels in all their products and services. In the same vein, if developed nations wish to remain globally competitive so the standard of living of their citizens is not compromised, they must continue to strive to reduce defects in all their products and services. Since six sigma is *the* approach to reducing defect levels in all repetitive activities, nations really have no choice but to embrace six sigma in all their activities if they are desirous of achieving or maintaining globally competitive positions. The United States must embark on a national six sigma campaign!

Suggested Action Plan.

An assignment of this magnitude will necessitate substantial planning and resources although outlays will pale in comparison with the rewards. A team can be assembled to discuss and make recommendations on a forward action plan. The author would be very pleased to participate in the endeavor. Author's executive overview on six sigma may be useful to kick-start the discussions on a forward action plan. The overview could change participants forever. Successful implementation of the proposed activity would lead to a substantially higher percentages of US businesses embracing six sigma. Next, all Government departments and offices must embrace six sigma in their activities. Finally, Six sigma training programs must be introduced in the institutions of higher education at large so the graduates entering the work force can hit the ground running.

References.

The following individuals may be approached to comment on the merit of this proposal.

1. Mr. Gordon England, Deputy Secretary, U. S. Department of Defense.
2. Dr. John F. Welch, Jr., former Chairman, General Electric Company.
3. Dr. Vijay L. Kelkar, Chairman, Finance Commission, Government of India.
4. Dr. D. Sudharshan, Dean, Gatton College of Business and Economics, University of Kentucky
5. Dr. Imad M. Alatiqi, Secretary general of Private Universities Council, Ministry of Higher Education, State of Kuwait.

Further Reading.

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2. **Deshpande, P. B.**, "A Small Step for Man: Zero to Infinity with Six Sigma, Six Sigma" and Advanced Controls, Inc., 2007. (Available on Amazon.com)
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8. **Welch, J. and Byrne, J. A.**, "Jack: Straight from the Gut", Warner Books, Inc., New York, 2003.

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