

Using Six Sigma Management in Health care Industry

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Author: Fulbright Professor, PhD - Kakhaber Djakeli
The Tutor of the article Yale Professor Dr. Hong Wang
Direction – Quality Management, Marketing and Health Economics

“You’ve got to be passionate lunatics about the quality issue....This has to be central to everything you do every day. Your meetings. Your speeches. Your reviews. Your hiring. Every one of you here is a quality champion or you shouldn’t be here...If you’re not driving quality you should take your skills elsewhere. Because quality is what this company is all about. Six Sigma must become the common language of this company...This is all about better business and better operating results. ”

Jack Welch CEO of General Electric (The Speeches of Manager – The New York Times February2006)

Abstract: The Six Sigma approach after determining the real issues revolves projects to reduce the errors in key areas (cost, schedule and quality) of organization. To accomplish the determining targets and solve problems Six Sigma leaders trainee executives who are entitled as Black Belts being selected from experienced managers and have been shifted from their past working places to the Six Sigma staff. To increase and hold the market share, to pick up the sales and compete successfully all types of organizations have to reduce the errors (defects) and improve the quality with the degree of the customer’s satisfaction. It is remarkable that in 21st century poor quality of products and services has crucial role even for the great companies hence this affects company in two ways: increases costs and reduces customer satisfaction. The basic level of quality can be improved through reducing of errors using the Six Sigma. The article shows some successful projects and initiatives taking place in the United States of America using lean and change methods in healthcare. The following ongoing Six Sigma Projects make us to assume the factors of Six Sigma success in healthcare industry. Successful Six Sigma Strategy involves continual success of projects, improving the ability of organization to achieve the goals and targets. To answer on main question – “what makes Six Sigma successful in health care business?!” during the period of October to December 2006 Georgian Humanitarian Institute of health Economics and Insurance and author of this article Fulbright Professor Dr. Kakhaber Djakeli with Yale Professor Hong Wang have established Delphi Survive of physicians participated in Six Sigma approach. The results of survive were amazing interesting for the further development of Six Sigma Management in health care industry worldwide.

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Chapter 1. Background – six sigma strategy as driven force for the company in 21st century

To increase and hold the market share to pick up the sales and compete successfully all types of organizations have to reduce the errors (defects) and improve the quality with the degree of the customer's satisfaction. It is remarkable that in 21st century poor quality of products and services has crucial role even for the great companies hence this affects company in two ways: increases costs and reduces customer satisfaction. The low satisfaction of customers creates the price pressure and lost in sales initiates the lower revenues from the sales. The combination of higher costs and lower revenues brings the company down (Figure 2).

To determine the objectives and targets towards satisfaction of customers, what managers have to do, the development the quality is necessary. The model created by Noritaki kano represents the way of quality towards the main target of all organizations – more satisfaction of customers. The product's quality (see the figure below) is determined on X axis and degree of customer satisfaction on Y axis, The motion of expected quality (in the form of diagonal line) indicating an ambivalent level of satisfaction, sequencing between the satisfaction and dissatisfaction are expected when quality rises from the basic level to the level of expected satisfaction. Determined by Kano basic quality level (figure 1) after some period without revamping or improving always tends to dissatisfaction of consumers. The customer satisfaction can be accomplished if they are exited by improving of quality.

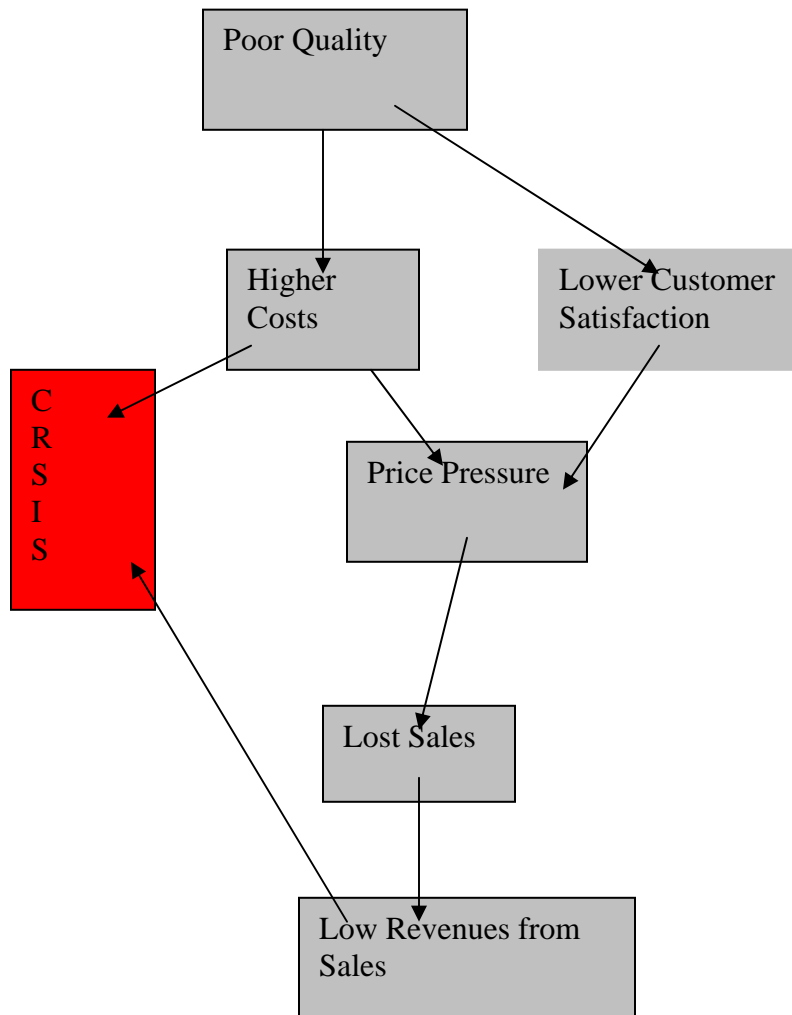
(Figure 1)



According to this model we can see that competitive pressure tends to push the expected quality line in the upward direction. Successful companies do their best to overcome the line of expected quality and give more satisfaction to their customers. The basic level of quality can be improved through reducing errors using Six Sigma.

The father of Six Sigma strategy, Bill Smith at Motorola, developed the quality management system that would be entitled Six Sigma. Sigma is the Greek letter used by statisticians to denote the standard deviation for a set of data. The standard deviation provides an estimate of the variation in a set of measured data. A company knows well the stated level of defects – it is Six Sigma is used to describe how well the process variation meets the customer's imagination about quality of end products or services. Redistributing the errors and defects in the working process would have the bell-shaped figure. Calculating the value of the standard deviation we estimate the distance of any value from the centerline – what is the standard deviation for a set of data. For example, if the process centerline for the wait time by the physician (gatekeeper doctor) at the hospital is 10 minutes, and the standard deviation on the wait time is calculated as 2 minutes, then six standard deviations, or six sigma from the centerline towards the negative direction is minus “-2” ($10 - 6 \times 2 = -2$) and 22 towards the positive direction.

(Figure 2) How Poor quality affects the all processes in organization



Using the customer surveys, focus groups, or simple feedbacks, customer requirements may have been established for the all levels of organization. The calculation of DPMO – defects per million opportunities is the important factor of six sigma concept development, estimating the today’s stage of organization to plan the reducing of defects and mistakes and move towards next sigma. Using the Six Sigma approach any known process error rate can be directly converted to a Sigma level. According the arrangement made by Keller most companies work between three and four sigma level ranges based on their published defect rates. Independent processes also can be measured according the six sigma strategy. It is usual that companies operating between one to three sigma levels can not hold their market share and be profitable for a long time. Companies with low sigma levels leave the market slowly or they need a lot of money to reestablish their strength and return loyalty of consumers.

Improving their customer’s satisfaction, companies increase their sigma level. The Six Sigma is meant as significant achievement entitled by famous field expert Joseph Juran as “Breakthrough”.

Some readers of this article would ask about differences between Total Quality Management (TQM) and Six Sigma approach. Satisfying their curiosity it is possible to distinguish four key differences between the Six Sigma deployment and TQM:

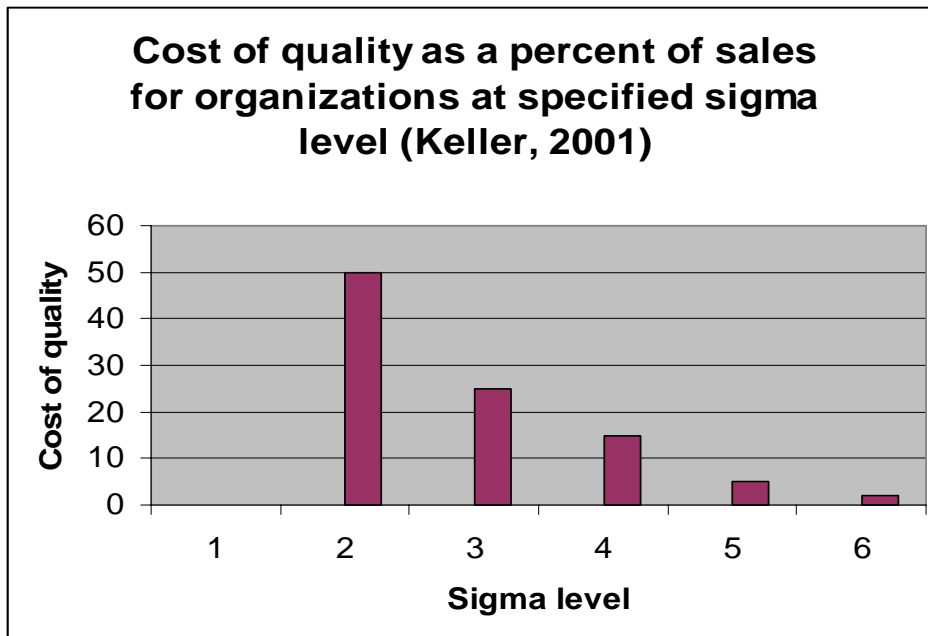
- a) The Six Sigma approach after determining the real issues revolves projects to reduce the errors in key areas (cost, schedule and quality) of organization. To accomplish the

determining targets and solve problems Six Sigma leaders trainee executives who are entitled as Black Belts being selected from experienced managers and have been shifted from their past working places to the Six Sigma staff.

- b) The organization supports the Six Sigma activities and uses them to develop the organization and its human resources. Distinguish is that the approach supports the championed individuals in mid and upper levels. All staff must be trained at least to green belt level and individuals are going to rise in their carrier must achieve the black belt level.
- c) The Six Sigma Methodology is very clear is basing on training activities entitled as DMAIC pronounced as Dah-May-Ick, acronym of the following terms: Define, Measure, Analyze, Improve, Control.
- d) It is approach where training process starts from the top managers going down to mid level managers and all employees.

The financial contributions created by implementing six sigma strategies into work are most amazing and profiteering. It is suggested by a lot of managers that Six Sigma deployments doesn't cost, it pays.

(Figure 3)



The figure above represents the cost of quality as a percentage of sales. If the company operates on two sigma level – 50% of sales is spent on non-value-added activities. It is easy to see now why for-profit organization can not hold its market share for a long time. At three to four sigma organization usually spends less from 15% to 25% from the sales on quality improving activities sometimes entitled as costs of the hidden factory in the organization. Some quality costs entitled as “the costs of doing business” remain as unreported burying in general operating costs.

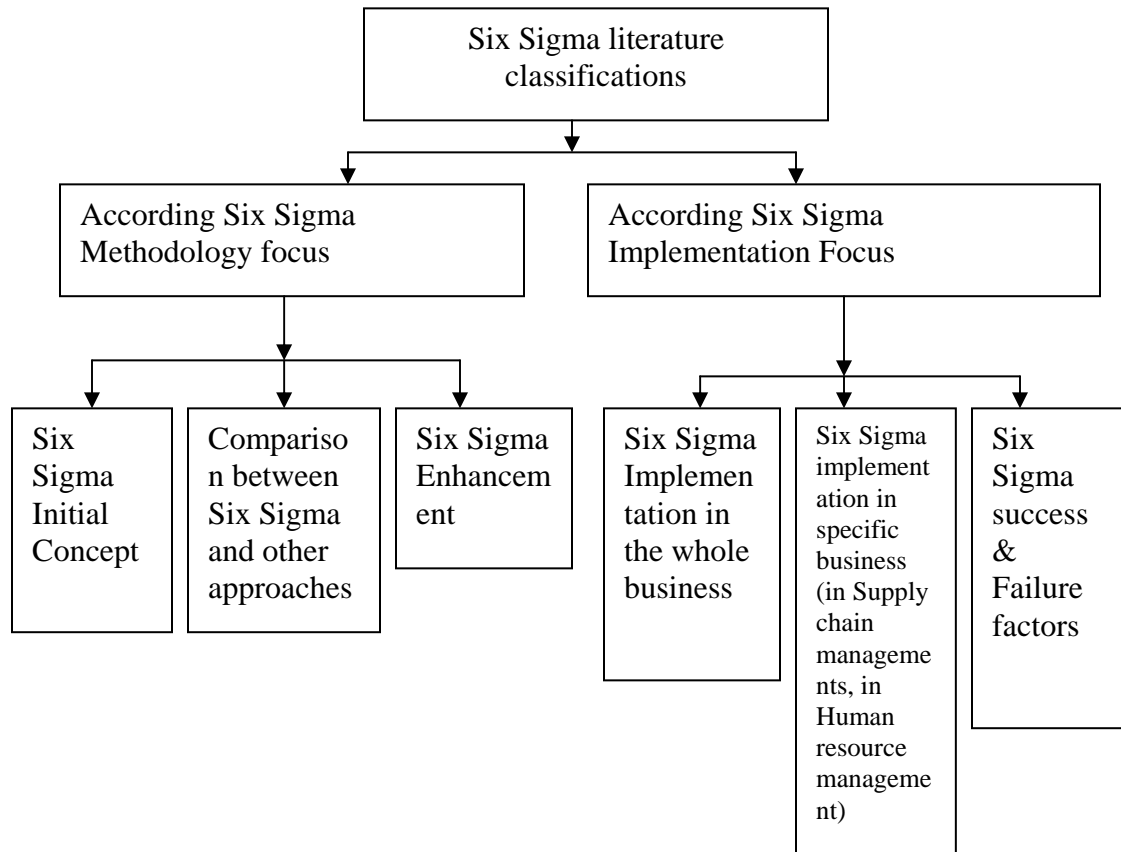
If organization totally reduces the defects in manufacturing, sales, customer services, management and other important fields moving to breakthrough level the costs of quality drop to around 7% to 5% of sales. The six sigma organization can expect to spend only 1% or 2 % of sales to quality holding activities and be the best on the market. Six sigma strategy according its capability to reduce the costs of quality can be used also as the investing source, hence saved money could be invested or reinvested into modernization of organization and now - how activities. Being able to utilize all resources fully six sigma organization can be very interesting also by the investors buying its stocks.

Six Sigma projects after evaluating customer requirements must be focused on the deployment of processes. Providing financial benefits such projects must be used to maximize customer satisfaction. “The optimal value for the product or service typically lies midway between the requirements, with deviation from that point less desirable” (Keller). If company makes a product customer wants to use it in a consistent manner and if company provides a service customers want that service to be consistent so they know what and when expect as benefit of it. Also products and services must be substitute with other products and services being under use of customers.

2. The Researches and the Implementation of Six Sigma approach in Health Care Industry

The six sigma papers published on different economic, health economic and special scientific magazines. The literature about the Six Sigma in Healthcare management can be classified into two groups: Six Sigma Methodology and Six Sigma implementation. Each group according the studied topics can be divided into three further categories according the following figure:

(Figure4)



The theoretical ground for the Six Sigma implementation in the health care industry was the article “Is Health care Ready for Six Sigma?” (Dr. Mark Chassini – The Milbank Quarterly, Vol. 76, No. 4, 1998) examining how Six Sigma strategy could improve methods have been deployed within the healthcare industry and what kind of results it would have to bring. Having concluded in his article the interesting character of Six Sigma approach for the quality improving in health

care Mr. Cassini wrote -“we can learn a good deal from industries that are working toward the Six Sigma goal. Let’s try it in health care and see how close we can get”.

Authors devoted their works to Six Sigma implementation into healthcare have been using descriptive, empirical, and conceptual and literature review methods. Descriptive method explains and describes different aspects of Six Sigma with or without background business information. Empirical method uses data from field work or secondary data sources. These studies sometimes have case study character. Conceptual method is used to explain new models and develops ways for its confirmation. Literature review methodology reviews all relevant literature about the approach.

After some period early adopter hospitals implementing the Six Sigma determined it to make challenges facing health care, including patient safety, optimization of all proceeding, rationalization of the use of a lot of new technologies, market growth, utilization of resources, length of stay.

In 1999 The Medical College of Wisconsin and the American Society for Quality (ASQ) established the first medical center named Froedtert & Medical College to implement into practice Six Sigma approach. The focus on Six Sigma was chosen on medical errors being responsible for the deaths. As it was realized by the National Academy of Science’s Institute of medicine, errors were responsible for more than 44,000 deaths every year.

From this period the scientific articles being devoted to the Six Sigma use in healthcare according the main objective could be divided into two groups:

- a) **The articles emphasizing the human errors in healthcare and use Six Sigma approach to reduce them:**
- b) **The articles underline the errors in management, pricing, placing, marketing, justice, planning and economy.**

a) The articles emphasizing the importance to reduce the human errors approximately have been created by the Institute of Medicine’s (IOM) report titled “To Err is Human” underlining that the American healthcare system was remarkable for its high achievements but also for high potentially errors and defects. According this unintended human error was responsible for many medical mistakes. Bet Lanham, RN, BSN, Quality Management Six Sigma Coordinator in his article (March 2003 issue of the Journal Nursing Economics) wrote -“The quality of our current care delivery system is, to a large extent, dependent on complex internal systems working smoothly and efficiently together. The problem is not bad people in health care – it is that good people are working in bad systems”. Lanham described the methods being used by Froedtert & Medical College to improve patient care and reduced errors according the Six Sigma strategy:

- 1) Drug project consisted by -1. Concentrations prepared by the pharmacy;2. How physician orders were formatted; 3. How nurses calculated drip rates.
- 2) Patient Controlled Pumps for Administering Pain Medications- 1. The pharmacy reviewed orders earlier in the process and intervened nonstandard medications were ordered. 2. Medications that were kept in patient areas.

Described by Lanham the staff of Froedtert & Medical College have completed six sigma training. The staff could eliminate errors in the following areas:

1. Patient falls in the rehabilitation unit;
2. reducing the time a physician orders an antibiotic and the patient’s receiving it;
3. elapsed time from when a patient diagnosed with a heart attack arrives at the hospital to treatment in the catheterization lab;
4. Frequency and severity of low glucose readings in insulin patients;
5. Post-operation narcotic sedation;

B) Underlying the importance of the use the Six Sigma strategy in the health economic activities some authors emphasize the methods appoint to cut costs, increase revenues, optimize all processes, research markets, harmonize supply and demand, compete with others as it is done in business doing service companies and corporations.

According the study of Dr. Pexton “In some cases, it has been to focus on a specific department or process and in other cases it has been implemented on an enterprise-wide basis to achieve a cultural transformation”.

(Table 1-Source GE Healthcare – the article of Pexton “Measuring Six Sigma Results in Healthcare industry” Scientific magazine “I Six Sigma Magazine”)

Sigma level	Patients with misplaced Personal Items	Coding Errors Requiring Correction	Phone calls Exceeding the two Minute-on-Hold Limit	Defects/Million opportunities	Percent Yield
3 sigma	3,660 Every Day	770 Per Day	267 Each Day	66,800	93.32000
4 sigma	340 Every Day	72 Per Day	24 Each Day	6,210	99.34900
5 sigma	12 Every Day	13 Per Day	5 Each Week	230	99.97700
6 sigma	6 every day	10 Per day	3 Each Year	3,4	99.99966

The ongoing successful Six Sigma projects in the healthcare of the US make us to assume the main features of well done Six Sigma activities:

1. Six Sigma approach sets measurable and achievable objectives aligned with organizational goals;
2. Six Sigma approach provides strong leadership involvement and support;
3. Six Sigma changes and improves the healthcare organization’s culture;
4. Healthcare leaders select most sensible knobs for six sigma implementation to achieve financial and quality results;
5. Training Black and Green belts and distinguish champions are easy in healthcare industry;
6. Six Sigma makes distinguish roles and responsibilities of participants;
7. Six Sigma strategy emphasizes the success trough more satisfaction of customers;

In financial points of view we are facing huge savings by those healthcare companies being involved in Six Sigma in right form and right time (Table 2).

(Table 2 the savings by implementing Six Sigma, source scientific magazine “I Six Sigma Magazine”)

The saved sums in USD	2004/2006 Implementing the Six Sigma Approach	The place
957000	reduced the wait time, higher satisfaction	At raiders regional Medical Centre Alexandria, Louisiana
1200000	75% reduction in bloodstream infection rates in surgical intensive	Yale - New Haven Medical Center
1300000	reduced surgical cycle time, adding capacity to additional cases	Valley Baptist health System in Arlington
2200000	improved diagnostic imaging	Boston Medical center
4000000	cash flow improvement and cost savings	Thibodaux Regional MC
5200000	lab increased capacity per 2,08 per lab per week day	Pittsburg Medical center
6000000	cost savings	Good Samaritan Hospital LA
7000000	Staff and patient satisfaction by better quality and savings	Commonwealth Health Corporation Kentucky
40 000 000	change management on the enterprise basis across for regions	Providence health System , with headquarters in Seattle

Six Sigma have been adopted in conjunction with lean methods considered as an effective tool achieving significant improvements in healthcare industry. Most organizations having already implemented Six Sigma are making success in quality, safety and financial stability.

But according some researches Six Sigma faces difficulties being created by wrong management. Some hospitals having implemented Six Sigma did not see the breakthrough increases in quality, reductions in errors and gains in fiscal savings that Six Sigma promises. What's the mater? Why one part of healthcare industry success and other remains unsuccessful? What is significant difference in hospital organizations that may determine interesting features of success in the way of six sigma implementation?

3. What makes implementation of six sigma successful analyzing the results of survive

In some cases it is suggested that problems arise because Six Sigma implementation was made in an inappropriate context, arguing that Six Sigma is more suitable for manufacturing than non-manufacturing processes. Investigating the negative reactions from people we see that success of this approach implementing is closely related to organizational culture.

McAdam and Lafferty ("A multilateral case study critique of six sigma; statistical control and strategic change", International Journal of operations & product management -Volume 1 N1; 2004) presented the study using a multilateral case analysis from both a processes and people perspective. They also have found low success in non-manufacturing areas. From the perspectives of employees they have investigated problems due to lack of empowerment and suggested that the organization needs to evaluate the existing culture, empowering employees where appropriate, before adopting Six Sigma into the organization.

Some authors present controversial papers, focusing on key criticism of Six Sigma suggesting the possibility of the negative impacts as there is often an overemphasis on using quality methods rather than focusing on improvement efforts.

To answer on main question – "what makes Six Sigma successful in health care business?!" during the period of October to December 2006 Georgian Humanitarian Institute of Health Economics and Insurance has established Delphi Survive of physicians participated in Six Sigma

approach. Answers of interviewed American physicians (in the framework of questionnaire established by the Georgian Open Humanitarian Institute of Health Economics and Insurance (GOHIHEI) and the Author of this article) were amazing interesting for the further development of Six Sigma Management in this industry:

- a) The 71 percent of interviewed physicians in the state Connecticut confirmed us that the correct implementation of six sigma in health care organization is the guaranty of success;
- b) The 65 percent of interviewed physicians say that improvements are limited in part because senior managers have too narrow awareness of six sigma targets and implementation objectives. Instead of deep awareness they frequently focus on the question about how many black and green belts they must have.
- c) The 34 percent of interviewed physicians decided that Six Sigma by itself does not conquer all inefficiencies caused by flow processes that characterize the healthcare industry and environment.
- d) The 67 percent of interviewed physicians claimed as too important for the six sigma success executive involvement in it.

4. Policy recommendations

According the results of the framework of questionnaire established by the Georgian Open Humanitarian Institute of Health Economics and Insurance (GOHIHEI) it is possible to create the recommendations for healthcare organizations worldwide are going to adopt Six Sigma strategy:

1. Executives must develop wide awareness about targets and objectives of six sigma implementation into organization. Instead of question how many different belts they should have in the process they have to create the question in the minds of participants about – what do we want to focus to become best-in-class service providers to satisfy needs of our customers?
2. Inefficiencies occurring in health care industry are a) waits, delays and errors and b) flow related problems. The Six Sigma usually cares the inefficiencies. To solve the second type inefficiencies better to use lean methodology. Combining the lean philosophy with the Six Sigma is important.
3. According experiences of the six sigma use – Secretaries, clerks and supervisors must be encouraged to become Green Belts and to improve their core competencies, making them leaders in future.
4. Executive involvement is the key factor to the Six Sigma's success in healthcare organization.
5. Senior leaders must commit to the cultural shift that is necessary for making and maintaining significant achievements.
6. The main reason Six Sigma is successful at healthcare organization is that it has been hardwired into the organization's culture.

Finally it is benefiting to remember to Six Sigma adopters the article of famous Theodor Levite – “Myopia of Marketing” suggesting instead to see problems narrowly determine customer's demands widely to satisfy them efficiently.

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Kakhaber Djakeli

Fulbright Professor at Yale University School of Public Health
 Yale School of Public Health
 P.O. Box 208034
 New haven, CT
 06520-8034

Tel: (203)785 28 61

Fax: (203)785-6193

E-mail: Djakeli_kakhaber@fulbrightweb.org

Private E-mail: Djakeli21@yahoo.com