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SIX SIGMA APPROACH TO QUALITY AND PRODUCTIVITY IMPROVEMENT IN INSTITUTION FOR HIGHER EDUCATION IN THE UNITED STATES

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ABSTRACT

Institutions for higher educations including universities and for year colleges in the United States have been continuously striving for higher quality under the continuous pressure of public scrutinizes, budget crunch and cut in private, state and federal funding. While demand for higher quality and productivity in higher education has been continuously growing the nations' institutions of higher education are still run like seasonal business with escalating cost and low productivity. This paper attempts to develop a model for Six Sigma approach to improve quality and productivity in institute of higher education in the United States.

INTRODUCTION

Our nation's institutions of higher education are continuously seeking creative ways to manage the ever increasing costs of providing quality higher education to our growing young middle class high school graduates under constant pressure of public criticism and cut in private and public funding with very little success. A recent survey revealed that 93% of the American public agreed with the proposition that "colleges an universities are among the most valuable resources in the U.S (Gilbertson, 2004). On the other hand, funding for higher education has been continuously dwindling and loosing priority and public support due to intense desire of tax payers for immediate tax relief. Consequently, there has been efforts to raise income by such measures such as fund raising campaigns, seeking endowment and alumni support and unfair tuition rate hikes. While taking cost cutting measures such as hiring freeze, not even replacing retiring faculty and staff with new ones, increasing faculty loads and even increasing class size by adding more chairs in the class rooms and teaching classes with part-time lesser qualified faculty and graduate students. These traditional common income raising and cost cutting measures will eventually lower the quality of our higher in the long run, Since there is now quick fix of this long term problem unless academic administration's traditional old fashion easy going attitude and bureaucratic management approaches are replaced by innovative and aggressive management approaches such as Quality Function Deployment (QFD), Six Sigma Quality Management, and Lean Service Management (LSM), many of our nation's institutions of higher education will soon run bankrupt and our nation will face a major crisis in the coming decades.

GOALS AND MISSION OF OUR INSTITUTIONS OF HIGHER EDUCATION

Setting goals, and expressed them in written mission statements is one of the most important responsibilities of top management. The top management such as a President or a CEO of an organization is supposed to have a vision of the organization he/she leads and must set appropriate, feasible, and achievable goals and share them with its external

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and internal environment clearly by expressing them verbally and preferably in black and white. W. Edward Deming, who is considered as Father of quality management and in his Fourteen point suggestions for achieving for quality in an organization state that the top management of an organization who aspire for quality, must first express and share his aspiration for quality by mission statements printed and published clearly stating the Quality as the most important goal. (Deming, 1960). But a recent quality management survey of randomly selected sample of 100 nation's universities and four year colleges reveals that less than 10% of them have a clear cut written mission statement.

CAN UNIVERSITIES BE RUN LIKE A BUSINESS ENTERPRISE?

Many advocates that our institutions of higher education should run like a business enterprise and not like a charitable organization, a religious organizations, a health care provider, a media service or local government. Also in a recent survey 90% of respondents expressed a higher confidence on academic administrations than that of churches, health care providers, media services and local government (Gilbertson, 2004).

"Can our nation's institution of higher education be run like a business enterprise? Eric Gilbertson, President of Saginaw Valley State university on June 04, 2004 in Forum with Midland Daily news said "Yes". But he also retracted stating "this is a tricky business for the everything that produce a university's greatest value- intellectual freedom, personal attention to students time for contemplation and cultivation of imagination that necessarily precede achievements in research and learning do not always conform to tidy management and brutal cost cutting."

"What universities produce are not goods or even services" Gilbertson said, "their core business is the development of human potential, their "products" are ideas and discoveries". Universities do not just produce any product like a car, computer, or a vacuum cleaner, but produce an university graduates who are potential valuable human assets, such as future teachers, scientists, engineers, doctors, nurses, technicians, managers, artist, philosophers, authors, journalists, politicians, leaders, president and vice president of our country, the essential ingredients of our American society through recruitment in responsible private and public service jobs. Therefore, it is the responsibility of an university is to provide high quality graduates to meet the needs of the private and public sector jobs of the society. These programs are designed by qualified academicians in consultation with practitioners.

Program design:

Similar to product design in a manufacturing organization, design of academic programs are crital to achieving excellence in quality in higher education. Taguchi, the renowned quality guru emphasized that quality of a product is set at the product design stage. He introduced Quality Function Deployment (QFD) approach to product design, in which customers needs and expectations are first determine using customer surveys, and then those needs and expectations are prioritized, and translated into technical specifications of the product design. University programs are seldom designed using QFD approach. Consequently, many universities are still offering archaic programs, which produce graduates unsuitable to the needs of the society. Therefore, an institution of higher education should go through evaluation of all existing programs in perspective of the changing needs and expectations of the society, and redesign their existing programs or

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introduce new programs to replace obsolete programs. Of course, this program evaluation should be an ongoing process and be carried out by a joint program evaluation committee of faculty senate and academic administration.

The role of faculty in institution of higher education:

Faculty is one of the most valuable resources, its role in design, evaluation, redesign and delivery of academic programs should never be underestimated. A good teacher can turn on many of his/her students, and motivate them to become outstanding graduates who in turn provide outstanding services to the society. Teachers were revered as gurus in many ancient oriental societies, and were well rewarded with recognition and financial rewards. On the contrary, in many universities in the U.S., under constant threat of loosing jobs and benefits transformed into a rival unionized bargaining unit member, and gradually loosing their confidence, self esteem and identity. There is a slogan, "put your money where your mouth is". While in manufacturing and industries, significant amount of fund is invested in developing product and process designers (who are engineers and scientists), in institution of higher education very little fund is spend for faculty development, and there is very little incentive in attracting high quality faculty, and even replacing retired faculty. Consequently, the course load has been increasing, class size has been increasing which has been diminishing the quality of higher education.

The Unthinkable Waste

On the contrary, millions of dollars are invested in monumental buildings, which are under utilized and in high tech equipment, which are mostly run by under qualified, untrained and underpaid students and staffs. It is almost unthinkable that almost all of our nation's institutions of higher education are run like a seasonal business, only nine out of the twelve months of the year. During these summer months of the year all classrooms and almost all university buildings stay idle or unutilized costing millions of dollars of overhead expenses. Only faculty and some staff get laid off. What an unthinkable waste.

Six Sigma Approach to Quality Productivity Improvement

The Six Sigma has emerged in 1990s as a registered trademark and service mark of Motorola, INC. as a business process improved approach that seeks to find and eliminate causes of defects and errors, reduce cycle times and cost of operations, improve productivity, achieve higher asset utilization and better meet customer expectations (9). It is based on a simple problem solving approach entitled "DMAIC", which stands for: Define Measure, Analyze, Improve, and Control, which incorporates a wide range of statistical and other kinds of quality improvement tools and techniques. (10). The focus of Six Sigma is on improving four key initiatives: *Quality, Productivity, Cost, and Profitability.* Bill Smith, a reliability engineer at Motorola, INC. is credited with originating the concept during the mi 1980s. This concept was subsequently implemented at Motorola, INC. by Robert Galvin, its CEO. (2) Six Sigma was also implemented at General Electric Company by its former CEO Jack Welch who made it a popular approach to quality improvement initiative in mid 1990s. Since then, Six Sigma has been appealing to many top business executives, as compared to Total Quality Management (TQM), because of its focus on measurable bottom-line results and its disciplined fact-based approach to quality problem solving (3).

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The term "Six Sigma" has also been associated with process capability analysis where product specification and tolerance are compared to the inherent variation in the process of making the product. Six Sigma approach to process improvement focuses on reducing the variation in the production process to the point where it will be able to meet the specification and tolerance requirement of the product (7), by improving the process using process statistical tools such as process capability analysis, cause and effect diagram, and Statistical process control. Similarly, Six Sigma approach to product design focuses on improving the product design to meet or exceed customers' satisfaction by using methods such as Quality Function Deployment (QFD), Taguchi's methods of product design, and robust design. (6).

Six Sigma Quality Improvement Model

The Six Sigma quality improvement model has applied by Robert Galin at Motorola, INC. refers to the five step process problem solving approach known as DMAIC:(Define, Measure, Analyze, Improve, and Control) as explained below

- **Define:** this step defines who the customers are, what the customers want, the process capabilities, and provides objectives for project-based improvement efforts.
- **Measure:** this step measures the quality characteristics that reflects improvement in customer satisfaction and product performance and provides the metrics of data on which the improvement efforts will be based upon.
- **Analyze:** in this step, data collected in pervious steps are analyzed using analytical tools such as Pareto analysis , process flow diagram, fish-bone diagram, statistical process control charts, for identifying necessary design and process modifications for achieving customer satisfaction and performance objectives.
- **Improve:** in this step resources are allocated so that design and process modifications needed for improvement can be implemented.
- **Control:** in this step the process is monitored using quality management tools such as Pareto charts, and statistical process control charts to ensure that the performance improvements are maintained.

A Model of the Six Sigma Approach to Quality and Productivity Improvement in Higher Education

In the past decade most U.S. universities implemented the Total Quality Management (TQM) and Continuous Improvement (CI) approach to quality assurance instead of addressing the key issues of quality, productivity, cost, and profitability, using Six Sigma Approach. And has been continuously loosing productivity and expecting government subsidies for its survival. It is imperative that they take a good look at Six Sigma approach and incorporate it into their strategic planning process. The following diagram represents a model for Six Sigma approach to program design and process improvement that may be implemented for continuous quality and productivity improvement by institution of higher educations in the United States.

As shown in the diagram, Six sigma approach to program design forcuses on the continuous improvement of educational program design process through Quality

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Function Deployment (QFD) which involves stake holders (such as accreditation agency, prospective employers, parents, etc) needs and expectation survey, preliminary program design, offering the programs through test market, perfecting the programs through repeated cycle of redesign and field-testing, and test marketing, then only, finalizing the programs and offering the programs at the appropriate locations with proper marketing campaign (5)

CONCLUSION:

While Six sigma approach to program design focuses on improved design of educational programs which will not only meet but also exceed all take holders/customers' expectations, Six sigma approach to processes improvement involves process capability analysis to determine the capability of the process for offering good quality educational programs conforming to the needs and expectations of the stake holders. This involves faculty and staff development through improving faculty and staff, encouraging and investing on education, research and training. Thus, Six sigma approach to processes improvement focuses on achieving higher standard for quality of faculty and staff, and delivery facilities such as class rooms, libraries and educational technology. Six Sigma approach to program design and process improvement may be successfully implemented for continuous quality and productivity improvement by institution of higher educations in the United States as well as in other countries all over the world.

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