

Implementing Six Sigma Breakthrough Management Strategy in an Academic Department

Erdogan M. Sener
Indiana University-Purdue University Indianapolis, IUPUI

Introduction

The Six Sigma Breakthrough Strategy (SSBS) is one of the successful management strategies that have found a number of important followers in the last 10 years. The strategy has been implemented by work giant companies such as GE, Allied Signal, and Motorola with success leading to achievement of an exceptional level of quality in their work.

The Six Sigma Breakthrough Management Strategy was developed by Mikel Harry and Richard Schroeder and explained in detail in their best selling book (1). They describe the Six Sigma process as “designing and monitoring everyday processes to minimize resources and waste while increasing customer satisfaction”. They advise that “extra ordinary” sense be used to make extra ordinary improvements to an organization and that “common sense” only produces common results. They suggest that “organizations need ways of measuring what they claim to value (i.e . create metrics) and that you cannot change what you cannot measure.... and.....that you should query what you have taken for granted.”

Peter Pande, et al .. in their book, *The Six Sigma Way* (2), describe Six Sigma as “near perfection in meeting customer requirements” ... and as “TQM (Total quality Management) on steroids.” They advise that we should always think about “How we can make the customer more competitive. Anything we do to make the customer more successful results in financial return for us.”

The SSBS is successful and is a draw for several companies since it focuses on business processes, procedures, and components that encompass those processes and procedures to enhance quality and profitability in critical and selected areas.

In simplified terms, the SSBS relies on breaking down a process/procedure into its elemental components and then finding and correcting the links and variables/parameters that lead to dissatisfaction, errors, problems, and low quality. It relies heavily on identifying the elements/variables of a process, approach, or procedure, benchmarking status in each of these elements, and continuously measuring progress in these elements towards established goals or objectives.

The popularity of and what drives companies to SSBS is more than improvement of profitability and quality. It sets standards different from the conformance to traditional standards defined in terms of products or services that fall within allowed specification limits irrespective of how much corrective effort they may necessitate to fall within those limits. The standard definition of

SSBS encompasses “expected standards” as observed from benchmarks or foreseen by the established targets.

SSBS is process/procedure oriented. Its implementation targets specific progress goals for every process, making companies utilize new and improved technologies/means for enhanced process implementation.

SSBS also stands for quality. It allows companies to improve their profitability by developing and watching implementation of routine everyday operations in ways to optimize resource use while minimizing waste and at the same time increasing customer satisfaction. It provides guidelines for companies for preventing errors and mistakes and ensuring no lapses in quality. Besides providing a means for identifying and correcting mistakes/errors, it focuses on procedures for prevention of such in the first place.

This paper focuses on implementation of the SSBS in an academic setting to a University Department by concentrating on the parallels between operation of an academic Department and that of an industrial company or business. Universities are increasingly following the RCM Model (Responsibility-Centered Management) and thus relying on business practices for accountability. This makes drawing some parallels between business and academia valid. The paper identifies who the players are in this implementation, what processes are being targeted, what elements make up these processes, what is benchmarked, and what is constantly monitored in terms of a measurement system. The steps of employing SSBS in the business, operations, and procedures of an academic department are elaborated on, as well as, the difficulties being encountered in implementation of such a business strategy in an academic setting and what the expectations from the upper administration are turning out to be.

Introduction: Implementation of SSBS is an academic department

Increased demand by the public for accountability has fostered the adoption of RCM strategies by university administrations. This means each entity on campus is responsible for what it brings in, in terms of income from tuition, research, consulting, and other activities and for what it spends, in terms of salaries, expenses, travel, recruitment, etc. As such, a culture for living within a budget is being increasingly promoted. This approach provides a medium conducive to implementation of some popular practices employed by businesses and companies. SSBS is one such practice that promises to be of value in this respect in the opinion of the author, who is the Chairperson in the Department of Construction Technology of the Purdue School of Engineering and Technology. Without really employing the terminology of SSBS and scaring the faculty and staff with the notion that this is a business and not an academic department, the SSBS methodologies are being employed for some time now in the Department. Due to the RCM not being applied at the department level, however, the profitability aspect of SSBS need to be replaced with another objective. For the purposes of this paper “student satisfaction” was chosen as a SSBS objective. The table below shows the goals and objectives for which qualitative or quantitative evidence is collected regularly in the Department. Of course, any of these could have been chosen for an SSBS undertaking.

<u>Goal</u>	<u>Indicators of Progress</u>
Improve enrollment	<ul style="list-style-type: none"> Comparative headcount data Comparative credit hours data New degree programs started Student diversity achieved Use of distributed learning for instruction
Improve retention	<ul style="list-style-type: none"> Comparative retention rates and graduation rates (one year retention) Comparative 8-year graduation rates Satisfaction with academic advising in the Department Mentorship programs Tutoring provided for students and number of hours Minority students retained in programs Student scholarships awarded Recruitment activities Quality of student advising
Improve quality of academic programs	<ul style="list-style-type: none"> Review and accreditation of academic programs Student admission numbers Equipment expenditures in teaching labs Fund raising Emphasis on Communications Emphasis on using the technology Faculty development Number of full time faculty Staff development License/Certification exams taken by students Strategic Plan development New labs started
Increase research and scholarly activities	<ul style="list-style-type: none"> Research grants and contracts Faculty publications Collaborative work with in-state colleges Collaborative research with universities abroad
Improve connections with the industry and profession	<ul style="list-style-type: none"> Industry and alumni advisory groups Industry relations Paper reviews Master project agreements Outreach activities Internships/co-op for students Senior design projects involving the industry
Improve connections with community	<ul style="list-style-type: none"> Service Learning undertakings Community involvement

There are eight steps in applying the SSBS to achieve student satisfaction progress in an academic department: recognize, define, measure, analyze, improve, control, standardize, and integrate. Each step ensures a structured implementation of the strategy. These eight steps are addressed in one of the following four categories: identification, characterization, optimization, and standardization.

* Identification:

This is a combination of Recognize and Define in which the department makes itself familiar with the SSBS and is willing to use it as a tool for problem solving. This step includes the department's "recognition" of how its processes and procedures affect quality and student satisfaction and then its definition of what the critical-to-success process area is. The crucial issue to address in these two steps is the variability among procedures/processes and to what degree this variation has an impact on results in terms of cost, time, efficiency, errors, quality lapses, etc. "Academic advising" of students is a crucial area for an academic department in terms of its utmost importance in student satisfaction, retention, new student recruitment, and reputation. Despite this importance, the advising process shows significant variability between departments. In some departments, the department chair does all the advising; in others, it is divided amongst all faculty; in some others, there is a full-time person, academic or otherwise, who only does advising; and various combinations of the above and probably others. Departments adopt one of these and use it for decades without questioning its affects to the bottom line in terms of the above stated criteria, whereas, if possible, the process needs to be questioned and made an item for the next phase, characterization.

* Characterization:

This step combines Measurement and Analysis, which determine where the process is at a certain time when it is measured in terms of percent satisfaction with advising, for example, and indicates the goals to which the department should aspire by establishing the baselines, the benchmarks, and the targets, thus providing the level from which to measure the enhancements. In case of student advising, this could be a percent of satisfaction that has been achieved by other departments or the school or the university in general or a higher level if none of these is deemed challenging. The department leadership develops an implementation plan to minimize the difference between the current and envisioned process in order to reach the aspired goals for a particular service. This necessitates breaking and analyzing every service or product into its key components and determining what can be done short term and long term.

* Optimization:

The next step is optimization which combines the Improve and Control phases. This step, building on the analysis from the previous step, identifies what needs to be done short and long term to reduce the source of differences and chart a course to achieve the desired process and targets. Major procedural variables are identified and a crucial few that will have the greatest impact are isolated. Every step in the new process must be continuously monitored by tracking the outcome by appropriate measurements. The experience and know-how to be acquired from these steps is then utilized to enhance and monitor the process ultimately improving customer

satisfaction and service efficiency. In case of student advising, after the new process and its key steps are identified in detail, university survey results must be watched to measure the outcomes and/or surveys designed to get a grip on the outcomes more closely. It is to be expected that there will be short and long-term consequences that need to be measured and monitored.

* Standardization:

The final step is that of Standardization and Integration that is described as institutionalization. This stage requires that the department step back and look at how other things that go on everyday affect the item to which SSBS is being applied. In terms of student advising, the department has to look at how other routine daily activities such as teaching, research, grant seeking, consulting, and service affect student advising. It is often the case that student advising is seen as part of department service and takes second or third priority to teaching and research which faculty perceive to be their primary functions, often ignoring the fact that good student advising ensures a steady and happy stream of students, in the absence of whom there is no department in which to teach nor to do research for. Traditional faculty perceptions of priorities may not be in the best interest of the department and this is an issue that the Chair has to deal with to get all faculty behind the effort. SSBS enables all faculty and staff to see the fallacy in some wrong assumptions that may be inherent in the culture and often exasperated by the resistance to change.

Even though the above discussion has used student advising as an area in which SSBS can be applied, it is obvious that student advising is only one of the parameters in a department wanting to focus on student satisfaction.

Student satisfaction also depends on the following:

- delivering quality instruction
- delivering quality education on schedule (i.e. proper scheduling of classes with days, times in the day, semester, and year so that students can graduate on time according to their most convenient schedule)
- delivering education at the lowest cost to the student (even though this is not totally within the control of the department)
- ensuring that students are capable of doing the tasks demanded by employers and are gainfully employed as a result.

Of course, there are other things that can be added to this list depending on how student satisfaction is defined and measured by the department. It is important to note that, like student advising, any of the above can be made a topic for SSBS implementation.

Scope of SSBS implementation in an academic department:

The academic department can be divided down into three main levels. The highest level is the “business level” that is the overarching level that includes everything related to the department. The next two levels are the “operations level” and the “process level” respectively. The SSBS can be applied at each level to solve the problems at that level to ensure quality, student

satisfaction, or other objectives as foreseen in the vision, mission, and goals/objectives statements of the department.

- Business level:

At the business level, the SSBS concentrates on enhancements to the infrastructural, informational, and educational systems used to run the department such as student and industry feedback, faculty quality and capability, and facilities (labs, classrooms, instructional technology, etc.).

- Operations level:

At this stage, the SSBS helps to uncover “operational” issues in the academic department in terms of teaching, research, and service. Establishing priorities and/or a balance between these for the development of both the department, as well as, the faculty member is needed. The common issues related to teaching loads, release time for research, and service expectations reside at this level.

- Process level:

This level is the subject of SSBS in terms of recognizing poor processes that take away from overall student satisfaction and create lapses in quality. Student evaluations of faculty teaching, evaluations of faculty by the Chair, recognition of faculty achievements, salary raise policies, travel funding, and elimination of performance inhibitors for faculty, all reside at this level.

Any or all of the above levels can be made targets for SSBS implementation. It is important to recognize the importance of benchmarking and what to measure in all SSBS activities at any level for any element of procedure or service. The Department of Construction Technology at IUPUI has established a base point for the parameters listed above and is benchmarking these either internally with other departments or the School or with the University overall depending on availability of quantitative and statistical data. Benchmarking across other Schools and Departments of the same or similar missions will be the next phase of implementation of some of the SSBS.

Problems in implementation of SSBS in an academic department:

SSBS is not a bottom-up initiative. All implementation and deployment strategies must flow down from the upper University administration, through the School administration to the Department. Although RCM methodologies provide a medium for the fostering of SSBS in the University environment, the fact that RCM stops at the School level and is not implemented at the Department level causes major discouragement for a department and its faculty and staff who try hard to break away from the traditional and routine, but are not recognized or rewarded for it in some fashion. Another problem is the tenure system and how it works. Some faculty lose their enthusiasm and stamina over time and concentrate on other money making activities thus diluting their energy to concentrate on SSBS implementation and there is nothing much that can be done to change the course for such behavior.

Conclusion:

In its strict sense, using SSBS is a highly complex technique that relies extensively on statistical measurements, metrics, and benchmarking. However, as this paper has attempted to do, a lot of benefit can be derived from implementing the fundamental ideas/concepts associated with the SSBS technique in the manner described above with its well-defined steps. When one tries to implement SSBS in an academic department though, one has to be aware of the fact that this inherently top-down approach may have limitations if the upper administration is not buying into the process or not willing to implement the business practices of the University at the academic department level. This obviously hinders the reward process, which, should be a part of “doing good.” Nevertheless, faculty usually being idealists and for the most part not driven by monetary rewards, a lot can be achieved despite inherent hurdles in the academic system.

Bibliography

Mikel Harry & Richard Schroeder., *Six Sigma – The Breakthrough Management Strategy*, Random House, New York, 2000.

Peter S. Pande, Robert P. Neuman, & Ronald R. Cavanaugh., *The Six Sigma Way*. McGraw-Hill, New York, 2000.

Biography

Erdogan M. Sener., Professor and Chairman at the Department. of Construction Technology of Purdue School of Engineering & Technology at IUPUI. B.S. Civil Eng., Middle East Technical University; M.S. Civil Eng. Michigan State University. He has over 13 years of international industrial experience in design and construction and has been in engineering and technology education for more than 18 years. Member of ASCE, ASEE, ACI and is a registered Professional Engineer in Indiana. Prof. Sener was awarded numerous teaching awards including the Indiana University President's Award for Distinguished Teaching in 1993 and the IUPUI Chancellor's Award for Excellence in Teaching in 1994.