Quality Engineering

Quality Quandaries: Realizing Strategic Focal Points at a Business School

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Published online: 24 Apr 2015.

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INTRODUCTION

This column describes the deployment of a process improvement program in an educational environment. The environment under study is the institute of executive programs within the business school of a university.

The department under consideration organizes academic education for professionals. Students are enabled to attend lectures and tutorials because these are planned in evenings or all on one fixed day of the week. A high degree of service is offered to these students: many administrative tasks are taken care of, coffee is free, lectures are mostly given in small groups, and there is a dedicated front office student desk with low, if any, waiting times. A broad range of business-related master of science (M.Sc.) programs is offered; for example, Accountancy & Control, Actuarial Science, Management Studies, International Finance, Insurance Studies, and Business Administration (MBA). Preparatory programs (pre-M.Sc.) are tailored to the students' needs, depending on their previous education. Post-M.Sc. programs are offered that focus on professional training with an academic background, such as chartered accountants, auditors, and controllers. Since the arrival of new management in 2011, the department's strategic goals have been (re)defined, and Lean Six Sigma was embraced as the way of reaching them.

Lean Six Sigma is a methodology for process improvement. It prescribes how improvement projects should be run using a five-step approach. Underlying principles are that decisions must be data driven, projects should focus on the most substantial benefits ("big fish"), and these benefits should be aligned with the company's strategy. As the name reveals, it borrows many tools and techniques from Lean and statistics. Lean Six Sigma also gives recommendations for organizational structuring, to make it a way of working and thinking throughout an entire company (see, e.g., De Mast et al. 2012).

The outline of this column is as follows. The next section of this column discusses Lean Six Sigma and its deployment. The third section describes how the Lean Six Sigma program was initiated in the institute of executive programs. The fourth section describes illustrative improvement projects, the fifth section details the current state of the deployment process, and the final section concludes.

LEAN SIX SIGMA AND DEPLOYMENT

The core of Lean Six Sigma is its project-based approach to process improvement. Executors of these improvement projects are called Belts. There are various types of Belts, depending on the size (in both workload and benefits) of the projects they run. Orange Belts run small improvement projects on the workfloor and play a substantial role in assisting the larger projects. Green and Black Belts are partly and regularly exempted from daily work to run bigger projects. They run projects for their Champion, the owner of the process to be improved. A Champion provides resources like time and supporting team members and makes sure that the Belts keep their eyes on the big fish. Belts are supported by Master Black Belts, experienced Black Belts that have committed to supporting and training Belts. The program management monitors initiatives and tracks benefits. Senior business management sets the strategy of the organization, and project initiatives are developed accordingly.

This structure combines the bottom-up approach of improvement suggestions coming from the workfloor and the top-down coordination by the program management. An overview is given in Figure 1.

Improvement projects can be classified according to their complexity and the availability of a solution as explained in Hoerl and Snee (2013) (see Figure 2).

Lean Six Sigma is especially applicable to problems that are complex, where thorough research is required to find a solution. Its principles demand structuring the problem, and its tools guide Green and Black Belts

in solving it (see De Mast and Lokkerbol 2012). In cases of lower complexity, problem-solving techniques can be employed directly. When the solution to a problem is already known, a just-do-it approach is preferable over Lean Six Sigma, possibly with the help of a Lean or Kaizen event for the more difficult cases (cf. Imai 1986). Typically, Orange Belts are well-suited project leaders for projects that do not fall into the quandrant with unknown solution and high complexity. This accentuates the bottom-up structure of a Lean Six Sigma organization: Orange Belts run smaller projects themselves and provide ideas for more challenging improvement projects to Green and Black Belts. Whether this exchange of information works fluently depends on the maturity of the organization.

The approach of the Lean Six Sigma to process improvement is abbreviated as DMAIC. Improvement projects start out with a project definition (D), in which the Belt proposes a project. The scope of the project is defined using process descriptions (see, for example, Kemper et al. 2010). Further, a team is composed and potential benefits are calculated. With this information, a Belt asks for approval from the Champion and program management. Then, the measure phase (M) is started. The Belt selects measurable characteristics, called CTQs (critical to quality; see De Koning and De Mast 2007), that reveal the improvement potential and should reflect improvement after the project. This phase closes with a judicious evaluation of the proposed measurement procedure. In the Analyze phase (A), the performance of the CTQs is analyzed and
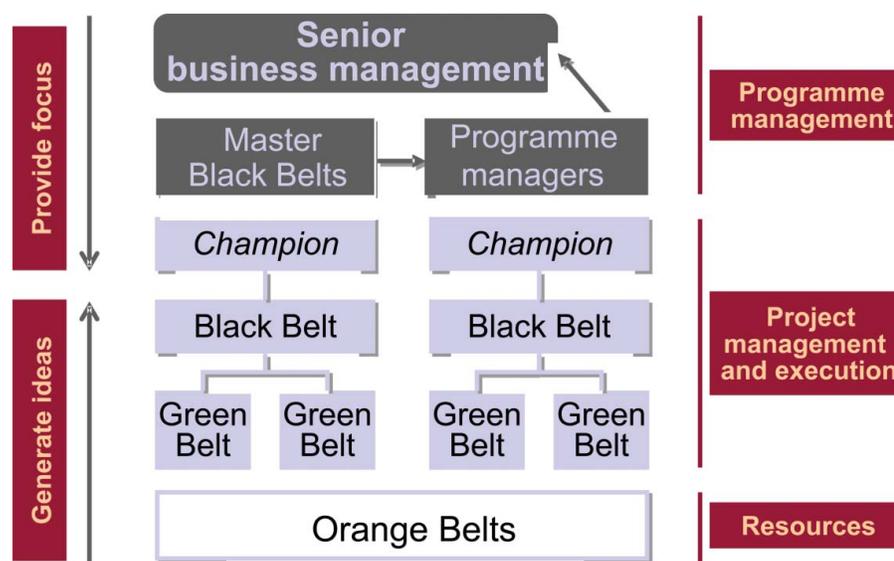

FIGURE 1 Organizational structure for Lean Six Sigma.
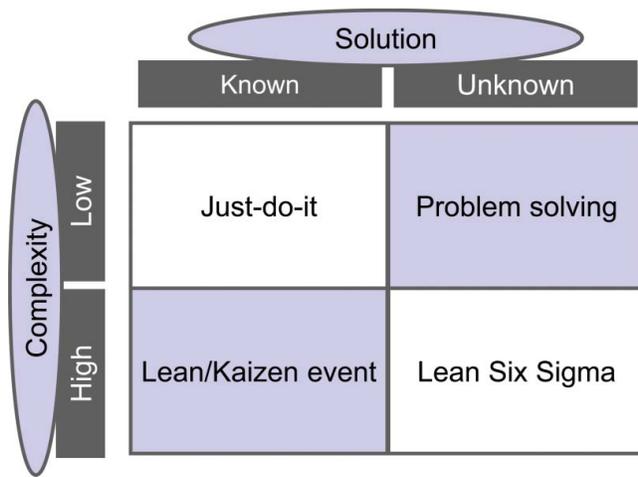
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FIGURE 2 High or low complexity, solution known or unknown.

influence factors are proposed. The Improvement phase (I) consists of finding evidence for the proposed influence factors, selecting the most important ones, and designing improvement actions that exploit these influence factors. The Control phase (C) is aimed at implementing process controls, designating responsibilities, and closing the project. An overview of the DMAIC steps is given in Figure 3 (cf. De Mast et al. 2012).

The duration of an improvement project typically ranges from 6 weeks (Orange Belt level) to 6 months (Black Belt level). Becoming a Lean Six Sigma organization is more than performing projects at will. An organizational structure (Belts, Champions, program management) should be in place, and these people have to be trained in, or at least be acquainted with, the methodology. Importantly, running improvement

Define	
Measure	Make the problem quantifiable and measurable
Analyze	Analyze the current situation and make a diagnosis
Improve	Develop and implement improvement actions
Control	Adjust the quality control system and close the project.

FIGURE 3   Overview of the DMAIC steps.

projects should become part of everyone's work. The process of satisfying these requirements is called deployment and usually takes several years of growing and learning (see, for example, De Mast et al. 2013).

INITIATION OF THE LEAN SIX SIGMA PROGRAM

In 2011, the institute of executive programs was reorganized and consisted of twenty-two employees afterwards. With this new organization, a new director was appointed to run and improve the department.

The strategic focal points of the department were chosen to be growth, standardization, and improvement. Firstly, growth is of utmost strategic importance to maintain market share under increasingly fierce competition. This is a particularly important focal point because, as opposed to regular academic education, executive education is not supported by government funds. Moreover, growth provides job security for the department's personnel. Secondly, standardization was chosen because every separate program was taken care of by its own team. Consequently, processes were not aligned and best practices were not carried over. Exchange of information was made almost impossible. Thirdly, improvement is aimed at reducing operational costs and increasing student satisfaction.

An internal consultancy unit was asked to give a three-day Orange Belt training to all employees and delivered temporary Master Black Belts after that. Contents of the training were the DMAIC steps and basic tools and techniques from Lean. In addition, two employees were trained to a Green Belt level. Later on, one Black Belt and two more Green Belts were trained.

The institute of executive programs is relatively small. As a result, a more reduced version of the organizational structure has been implemented. The Green Belts and the Black Belt function as a team of Master Black Belts, and the management functions both as Champion and program management. See Figure 4.

SOME ILLUSTRATIVE PROJECTS

In this section we summarize some illustrative projects, categorized by strategic focal points (growth, standardization, improvement) to give an impression about what kind of projects were run.

FIGURE 4   Reduced form of organizational structure.

Strategic Focal Point: Growth

Growth of the department of executive education can be quantified by the number of enrollments. A Black Belt selected "number of applications" to the international M.Sc. programs (international finance and MBA) as measurable characteristic. Assuming a constant conversion ratio from applicant to student, an increase in applications leads to an increase in student numbers. The analyze phase resulted in the distribution of the current number of applications per month and the conversion rate. In the improve phase, an experiment was started to establish the optimal settings of the scholarship deadline and an early bird discount deadline. The extra enrollments per September 2014 in the international programs have generated an extra income of €150,000.

A recently started project focuses on the corporate contacts of the business school. This project is valuable for recruitment but also for career services (helping graduates to find a job). Many groups within the department have their own list of contacts, which means that contacts are not easily shared (underutilization of contacts). In some cases, two groups use the same contact without knowing this. These groups could benefit from an exchange of information. Although the project is still in the analyze phase, both substantial monetary benefits are already realized as well as great improvements in quality. For two companies, custom-made programs were run in 2014. The extra income is around €300,000.

Every year, many students obtain a degree and become alumni of the business school. A Green Belt project aimed to stimulate growth by improving their alumni network. An improved network means more potential enrollments by existing or new students. Each program used to have its own procedure for staying in touch with alumni. The project started with an investigation of all those different procedures and motivated the use of Alumni-Ambassadors who represent the Business School on LinkedIn, during information evenings, and in their own professional network. An Alumni-Coordinator was hired to structure all of the separate initiatives. We expect substantial extra revenues from 2015.

Strategic Focal Point: Standardization

A noteworthy Orange Belt project, regarding standardization, improved the archiving of student information. Every program archived paperwork per student in its own way. Some did it digitally, some did it on physical paper; some archived all information, some just a selection. The project started with finding out what information should really be kept and what information could be discarded. Using a survey, the Orange Belt showed that digital archiving was the preferred option and digitalized everything that is not strictly required to be kept in paper form. Digital information is more easily found, takes less room, and is more securely stored (after implementation of a suitable backup policy). The project was closed with an instruction sheet detailing what information should be archived, and how.

The standardization is still ongoing. All Belts are asked to document exactly the processes they are involved in. This results in many different process descriptions for the same function. The best practice has been documented and implemented within the entire department. The documentation will also benefit new employees, who can then quickly learn how their work should be performed. Many employees who were specific to a program can now also support other programs. The job description "program assistant" disappeared in 2013 and was replaced by "educational assistant" to illustrate their all-round employability. The standardization of administrative processes has resulted in a personnel reduction of four full-time equivalents.

Strategic Focal Point: Improvement

There was not yet a policy for how new employees should be treated. They should receive accounts, a computer, desk, keys, a manual, and they should be introduced to various key persons, among others. Using surveys, an Orange Belt determined that this does not happen perfectly. In fact, new employees typically spend a lot of time over the first few weeks on

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finding information or supplies. The project resulted in a standardized checklist for new employees. Responsibilities for all checklist items are clearly defined. In a few months, new survey data will be collected to compare the old scores to the new ones. Job satisfaction of new employees is expected to improve, and the waste of productive hours of new employees is expected to be reduced.

A project on the Green Belt level focused on improving the quality of a particular M.Sc. program. The measurable characteristic of choice was the throughput time of students. The analyze phase showed that 71 percent of students took longer than the indicated 2 years to complete the program. Such a number may encourage future students to get their education elsewhere. Statistical analysis has selected various influence factors. One of them was the prerequisites: students without sufficient background in mathematics more often fall behind. Although mathematics is part of the pre-M.Sc. program, this is clearly not sufficient. Students are now asked to follow a refresher mathematics course before starting the actual program. Another influence factor is personal problems, something that is obviously out of scope. Moreover, the monitoring of the students' progress was improved. Students with a high likelihood of falling behind can now expect to be more strictly monitored, and even contacted, by one of the study advisors.

The process of subscribing, admitting, and invoicing students has been greatly improved by a Green Belt. After a thorough study of the processes, it turned out that many inefficiencies were present. For example,

many forms had to be printed out by students, filled in, sent by non-electronic mail, and then typed over into a computer system again by educational assistants. Software was purchased to allow for online subscription. The backend of this system includes automatic tracking of admission and creation of invoices. The project is currently in the improve stage. Commissioning is expected by February 2015. Afterwards, a second set of measurements will be collected to calculate the benefits of this improvement.

Deployment

Two years after the startup of the program, thirty-six projects have been initiated, of which twenty-four projects have been successfully completed. Projects regarding growth have focused on increasing student numbers and corporate contacts. Overall, student enrollments have increased by 22 percent in September 2014.

Projects regarding standardization have led to uniform examination regulations and graduation procedures. Many employees who were specific for a certain program can now work for any program. These benefits gave room to appoint three additional sales and recruitment managers to support growth. Recently, a team was appointed to document all of the processes within the department.

During the implementation of a Lean Six Sigma program, it is wise to monitor the progress. It is a long process that requires continuous attention. Deployment is not just a matter of starting projects but also a matter
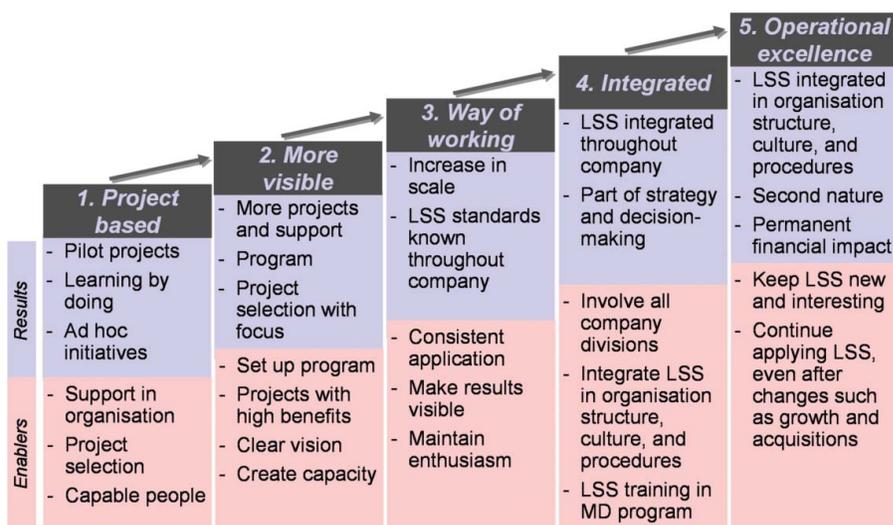

FIGURE 5 Five steps of Lean Six Sigma deployment.

of training employees to have an eye for improvement and providing the training needed to actually realize improvement. Raje (2007) proposed that deployment occurs in five steps; see Figure 5. A detailed example can be found in De Mast et al. (2013) and some general background about deployment in Hilton and Sohal (2012).

The top parts of the diagram contains the results: if some phase is finished, the results are visible. The bottom parts contain enablers. The deployment of Lean Six Sigma in the institute of executive programs is currently in the third step. That is, the Lean Six Sigma initiative is underway to being integrated into the organization.

Lean Six Sigma can nowadays be seen as a way of working. Employees evaluate their own processes and propose improvement initiatives accordingly. Improvement is a recurring item on the agenda during personnel evaluations and new employees are, by default, given the tools needed to run projects themselves.

A team of Green Belts and Black Belts has taken over the role of Master Black Belt. This means that the internal consultancy company is not necessary anymore, and the department can carry the Lean Six Sigma program in a self-sustaining way.

The extensive Lean Six Sigma toolbox and its rigorous structure have been tailored to better fit the organization. Templates have been built for the most used tools and techniques like process flowcharts, value stream maps, and 5S (5S is the name of a workplace organization method that uses a list of five words: sift, sort, shine, standardize and sustain). Less frequently used techniques regarding measurement system analysis and statistical evidence have been sidelined. This has made improvement a more accessible activity for the department's personnel.

Despite all this, integration is yet to be completed. A common problem is that employees are having difficulty combining improvement with their daily work and find it difficult to stay motivated. As a result, throughput times of projects usually exceed the standards (6 weeks for Orange Belts, 6 months for Black and Green Belts). Although the workload is calibrated such that there is time left for improvement activities, it requires skills and routine to prioritize and plan both aspects of working.

The next step will be to realize integration. This means supporting the employees and coaching them in how to divide their time and how to plan improvement.

Monitoring of projects is also important, in order to detect slow movers, and to keep initiatives focused on the strategy. It is expected that, after some time, running projects will become more doable for everyone, leading to more projects with lower throughput times.

CONCLUDING REMARKS

Lean Six Sigma is a way to reach operational excellence. It is not only a data-driven approach to improvement but it is also a mindset, a way of working and thinking. The deployment of Lean Six Sigma usually takes several years. Although many accomplishments have already been celebrated in the Department of Executive Education, employees need to make improvement part of their daily work. Currently, time management is an important struggle that needs to be overcome.

ABOUT THE AUTHORS

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