

Establishing a Lean Six Sigma Program in Higher Education

By Carsten Svensson, Mohamed Ba-Essa, and Majed Bakhsh

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Carsten Svensson¹, Mohamed Ba-Essa² and Majed Bakhsh¹

¹King Abdullah University of Science and Technology, Information Technology Department, Thuwal, Saudi Arabia

²King Abdullah University of Science and Technology, Library, Thuwal, Saudi Arabia

Carsten.Svensson@KAUST.EDU.SA, Mohamed.Baessa@KAUST.EDU.SA
Majed.Bakhsh@KAUST.EDU.SA

Purpose: The objective of this paper is a contribution to the body of Lean Six Sigma knowledge within the vertical of higher education institutions. The paper will review the initial phase of an implementation and highlight future challenges.

Approach: The observations presented in this paper, originates from rolling out a large lean six sigma implementation at a newly established university. The paper is supported with secondary data from literature.

Findings: The paper will discuss the challenges of applying the lean six sigma method in a complex transactional environment.

Research limitations: This paper is based on an empirical study of a single instance and authors' experiences as practitioners.

Originality: This paper is the first description of what is believed to be one of the largest implementations of Lean Six Sigma in higher education.

Keywords: Lean Six Sigma, Process Improvement, Business Process Management, Organizational Development, Higher Education.

Introduction:

Universities are increasingly working systematically with process improvement. One of the methods that have been widely applied in manufacturing and transactional industry is Lean Six Sigma (LSS) and universities are also increasingly showing interest in this process improvement method.

This paper is a case study of how LSS has been rolled out at King Abdullah University of Science and Technology (KAUST).

King Abdullah University of Science and Technology (KAUST), located on the Red Sea coast one-hour north of Jeddah, Saudi Arabia, was founded in 2009.

Focused exclusively on graduate education and research, KAUST's aim is to advance scientific and technological research in four broad areas: Water, Food, Energy and Environment.

The LSS program was launched in 2011 to systematically improve business processes quality.

Lean Six Sigma

The concepts of LSS can trace back its roots to the principles of scientific management (Taylor 1911). A 100 year history of systematic improvement of industrial processes have led to a very advanced level in terms of efficiency and quality management. However one might go as far as to argue that transactional process improvement is in its infancy compared to manufacturing, still waiting to undergo industrialization.

From an academic standpoint, several authors suggest that LSS is repackaging and simplification of well-known quality management concepts (Zu, Fredendall et al. 2008),(Näslund 2008). However the popularity and impact on businesses around the world cannot be disputed.

For the purposes of this paper, we will proceed with the following definition of the hybrid process improvement method LSS "Together Lean and Six Sigma combine their independent approaches to form a Lean Six Sigma approach that seeks to improve efficiency and capability primarily by removing wastes and variation" (Jing, 2009).

LSS in Higher Education

While LSS originates in manufacturing, the method has proven its merits in transactional industries as well (Ehrlich 2002). Some of the first organizations to apply LSS to improve administrative processes were the same manufacturing companies which had successfully applied the method in manufacturing. Over time a number of public sector organizations established noteworthy LSS programs such as the US ARMY (George, Rowlands et al. 2004), city of Fort Wayne (George 2003). While the universities have been under pressure to deliver measurable results due to increased reporting demands and increased competition for funding, Higher Education institutions have been slow in adapting LSS (Antony et. Al, 2012). From practitioners' perspective, the slow adaptation of LSS can be speculated that reasons include the decentralized nature of traditional universities, and that there is no direct linkage to the core business of research and education.

Universities are by measures complex organizations, managing significant resources. Being complex organizations, there will be thousands of business processes facilitating the primary functions and if the processes are streamlined then efforts can be focused the primary functions of research, innovation and education.

Role of LSS in serving KAUST strategy

The university has developed its business strategy around the advancement in science and technology through research and education. In order to be able to play this role effectively, the support services serving the university (such as administration, finance, procurement, IT, etc.) should be efficient in order to provide student and faculty with the necessary support to excel.

The LSS program plays an important role in serving the university's strategy. The focus of the program has been on streamlining the support functions so that these services are provided smoothly to students, faculty, and staff. It helps enabling a user centric approach and increasing efficiency and effectiveness of functions such as Graduate Affairs (student onboarding), procurement services, and IT services.

The LSS Program

The LSS program at KAUST was started with the objective to create a platform for improving process quality across the administrative functions.

The LSS program was started by the Information Technology department. The primary objective of the information technology department is to enable processes organization wide. Applying LSS will allow for the organization to ensure that processes are aligned to the overall objectives of the organization and ensure that technology facilitate the automation of well-designed processes considering all aspects for people, processes and technology.

The LSS methodology was chosen based on its structured, data driven approach, the emphasis on identifying internal and external customers and the construct of continuous quantitative monitoring process performance.

The program was started with the objective to provide staff members at all levels with a vehicle for change, as part of a culture of continuous improvement. By providing a method such as LSS, it is ensured that projects are structured and follows a predefined structure Define Measure Analyze Improve Control (DMAIC), leading to consistent results.

In the second year of the program, 25 projects have been completed and process quality is increasingly being discussed across the campus. Figure 1 illustrated the activities KAUST went through in establishing the program.

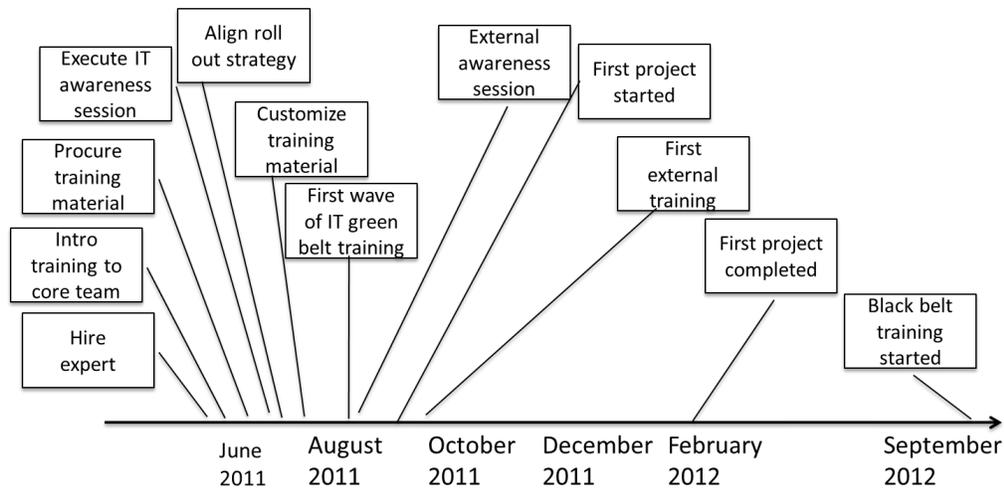


Figure 1: Timeline for rollout of LSS program

The training program

The training program was made available free of charge to all of the organization, the rationale being that it would become the shared standard for process improvement and that familiarity would facilitate acceptance and provide a shared platform for improvements.

Out of a staff of approximately 2000, 350 staff members have completed awareness training, 50 yellow belts and 150 green belts have been trained and the first ground of 7 black belts are in a training program tailored towards higher education as shown in Figure 2.

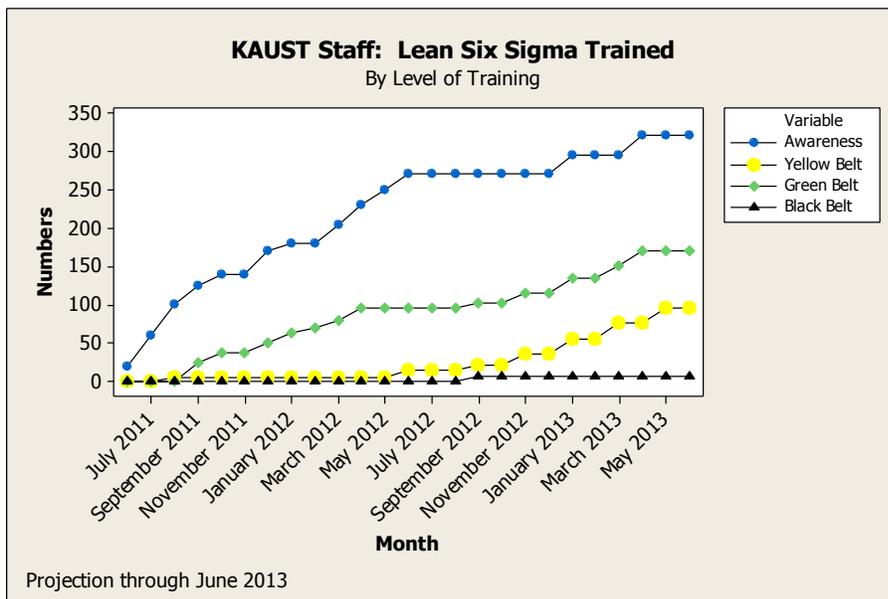


Figure 2: Summary of staff trained in LSS

The training was delivered by the in-house master black belt. The yellow belt training runs over 4 half days focuses on the applied lead process improvement tools. The green belt training course runs over 5 full days and has a stronger analytical component. Finally the 12 day black belt

training program builds on top of the green with advanced statistics and change management. The training material was purchased from an external provider because it was estimated that internal development of material would take a minimum of 3 months.

Coaching

The project managers ranged from junior staff embarking on their first project to seasoned professionals. To enable the successful completion of projects, project coaching was made available. The project coaching was proactive in following up with project managers and helping the project managers in overcoming obstacles and ensuring project quality. As the program expands, the black belt candidates are taking on coaching responsibilities as part of the black belt program.

Selecting initial projects

After the first wave of training was completed, the first projects were launched. While it was tempting to take on the organizations most pressing and visible projects, the strategy applied was slightly different. The initial projects were selected based on the control of the organization where the project was carried out, the availability of data, and skills of the specific belt.

As a result the initial projects were scoped to allow the belts to develop their skills, before taking on the more complex problems. Following the initial wave of projects the belts have taken on much more complex projects that have visibility across the organization.

Certain areas such as helpdesk or processes supported using IT tools proved to be particularly data rich and therefore good candidates for improvement projects that would deliver measurable improvements to internal and external customers. The initial projects were given ample time to complete, and one of the future challenges will be to set the expectation that completion time of subsequent projects will be reduced.

Involvement of executive management

To emphasize the importance of continuous process improvement, a committee of the CIO and the management group reviews two current LSS projects a week. The review sessions consist of a program status update, presentations of specific projects by the project manager followed by questions and answers. The benefit of these sessions is the clear commitment at the executive level and a continuous alignment between projects and overall organizational objectives.

The project presentations offer staff members at the operational level an opportunity to present their contributions to the organization. In addition to providing management with an overview of ongoing activities, it also helps the staff build generic business skills.

Example of initial project

One of the first process improvement projects were undertaken with the student onboarding team. All international universities have to go through a lengthy process involving visas, travel and accommodation for bringing admitted students onsite. The project approached the onboarding process from the customer perspective, in this case the admitted student. The process was documented using event driven process chains, and existing data was used to identify

variation in the duration for each phase of the process for individual students. Over 2,000 historic questions from students were categorized and analyzed as well historic timelines for onboarding of individual students. Current students were interviewed about their onboarding experience. Stakeholders involved in the visa process, travel and accommodation contributed to the revised process. Based on the analysis, root causes for delays were identified, processes were revised and communication was streamlined. Data errors that could delay the onboarding was prevented and the arrival process eliminated waste by reusing available information provided by the admitted students and improved controls on data entry. Following the initial project, the process has now gone into systematic improvement where the process is reviewed following each onboarding cycle, and a reduction in redundant processes and resources has been noted.

Next Steps

LSS program managed to prove its value to the organization by improving business processes, and enabling the University to operate more efficiently. The successful completion of projects helped individuals and process owners to understand the importance of LSS and also encouraged other process owners to undertake such projects in their respective areas. As a result, the frequency of project requests has increased at both green belt and black belt levels. Approximately 40 new projects have been initiated this year covering business process across the University such as information technology, human resources, finance, etc.

The LSS program is now out of the start-up phase. This has given reason to consider how the program is going to progress into the maturity phase.

To ensure that the process improvements withstand the test of time, cementing the concept of process ownership within the organizations will be critical. Additionally of particular importance is the continued monitoring of process performance, following the completion of an improvement project. Process governance should also be established, including periodic process reviews. The process owner must take responsibility for continuously improving process performance. A key component in this continuous improvement will be the identification and monitoring of key performance indicators.

The program has provided a plethora of benefits, on a program level the systematic registration of benefits will be improved, implementing a template for benefits registration inspired by MSP (Commerce 2003)

On a staff level, staff members have benefitted professionally from the training and completing projects, one of the forth coming challenges will be to ensure that the belts continue to undertake projects following the completion of their certification.

Moving forward, the objective of the program is to continue providing training to staff on the LSS methodology and we are continuing the sponsorship of this program in the University. In terms of areas, the target of the program is to further improve the processes in the administration and finance as well as to extend its support to the teams within the academic and research to provide training and support.

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