Helping Engineering Students Decide on the Advantages of Obtaining Lean or Six Sigma Certification

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Abstract

The benefits of applying Lean and/or Six Sigma principles in manufacturing and service industries are well-documented. Organizations spend considerable amounts of money delivering on-the-job training in Lean and/or Six Sigma tools and techniques. Increasingly, employers list Lean or Six Sigma certification as a desirable attribute for engineering or management positions. At one time, there were a limited number of organizations or institutions that offered quality-related certifications. However, current Google searches indicate the number of organizations is growing exponentially. This is mainly due to the increasing awareness of the value of Lean Six Sigma as a process improvement methodology. At our institution, upper-class engineering students who are actively involved in job searches are questioning the value of obtaining Lean or Six Sigma certifications during, or soon after, graduation. In this paper we discuss the development of a mini-curriculum in which we present advice we have given our students with respect to the relative value of existing certification opportunities. We discuss the variety of certification opportunities available, including the experience requirements, the time commitment, and the cost. The curriculum also includes data from our alumni and employer surveys. In addition, we emphasize the need for career planning and instruct students on the value of choosing internships and senior design projects that offer exposure to Six Sigma and Lean methodologies.

Keywords

Advising Students, Professional Certification, Lean Six Sigma, Six Sigma, Lean Six Sigma Certification

Introduction

As students begin to think about finding employment after graduation, they are looking for ways to improve their competitive edge. Certainly it is well-known that companies that are in a position to hire a new employee look at courses taken, grades earned, and work experience. Many employers also require that the applicants possess certifications, under the assumption that certifications validate that individuals have the skills and knowledge to ensure the quality of products and services.[1] Job announcements in the quality field may include statements such as '*ASQ certification required or encouraged'* or '*knowledge of Lean Manufacturing and Six Sigma preferred*'. Possessing one or more professional certifications has been shown to enhance career opportunities[2-4] . Increasingly, upper-level students have been asking the authors about the advisability of obtaining professional certifications in order to improve their competitive edge, especially when trying to obtain their first job after graduation.

History of Professional Certifications in the Quality Engineering Field

The American Society for Quality began developing and administering quality-related professional certifications in 1968. Since then, they have issued more than 200,000 certifications[1]. The first, and most popular, ASQ certification is the Certified Quality Engineer (CQE). Through the years, ASQ has developed many more quality professional certifications (eg CMQ/OE, CQPA, etc). All ASQ certifications are based on a Body of Knowledge (BOK) that is revised on a periodic basis. ASQ BOKs are the industry-standard in their respective fields.

At one time, there were a limited number of organizations or institutions (e,g. American Society for Quality, Motorola, Villanova) that offered quality-related certifications. However, current Google searches indicate the number of organizations that offer quality-related certificates is growing exponentially[5]. This is mainly due to the increasing awareness of the value of process improvement methodologies such as Six Sigma (1980's), Lean Manufacturing (1990's), and Lean Six Sigma (2000's).

At its essence, Six Sigma is a statistical methodology with a goal of reducing variation and therefore reducing costs[6]. Six Sigma has been described as a data-driven process improvement methodology that aims to reduce defects[5]. The Six Sigma problem-solving framework[7] is represented by the acronym DMAIC which stands for Define-Measure-Analyze-Improve-Control. In its original state, Six Sigma (SS) was built around employees who were trained as Green Belts, Black Belts and Master Black Belts. Companies found that it was time-consuming and expensive to allow employees to complete Six Sigma training and earn Black Belt or Master Black Belt certification by an outside agency. However, companies continued to encourage certain employees to obtain relevant certifications. As SS popularity has grown, certifications such as Yellow Belts and White Belts have been added.

Lean had its roots in the Toyota Production System and emphasized the elimination of waste with the goal of cycle-time reduction[8]. Lean Manufacturing proponents identified seven wastes based on Ohno's writings. However, the Lean methodology as applied to service industries as well as manufacturing now identifies eight wastes with the addition of *loss of human creativity or human potential*. In its original form, Lean did not emphasize data-analysis or statistical thinking. Because Lean principles were simpler when compared to Six Sigma, companies found that it was less expensive to obtain Lean training and certification by an outside agency. Eventually, larger companies began to offer their own Lean training and certification programs.

Around 2002, the term Lean Six Sigma (LSS) came into popular use[9]. According to George[9], Lean Six Sigma is a methodology that maximizes shareholder value by achieving high levels of improvement in customer satisfaction, process speed, quality and cost. It represents a fusion of two earlier process improvement methodologies: Six Sigma and Lean. Thus the DMAIC process and Black Belt system associated with Six Sigma and the emphasis on the elimination of waste that is the hallmark of Lean are combined in one comprehensive process improvement system. Individuals can be certified as Lean Six Sigma Green Belts, Lean Six Sigma Black Belts, etc.

Currently, many organizations and some higher education institutions are in the business of offering certification training and/or exams. As Laureani and Antony[5] observe, some companies have developed their own in-house LSS certification systems, thus adding to the confusion and lack of standardization regarding LSS certification.

Development of a Lean Six Sigma Certification Mini-Curriculum

The duplication of terms and the expansion of certifying organizations that have evolved over the past twenty-five years were the impetus for the development of the mini-curriculum in which we educate and advise students on the value of obtaining certification. We begin with the history of the development of Lean Six Sigma, as summarized above. We attempt to educate the students with respect to the relative value of existing certification opportunities. We discuss the variety of certification opportunities available, including the experience requirements, the time commitment, and the cost. The curriculum also includes data from our alumni and employer surveys. In addition, we emphasize the need for career planning and instruct students on the value of choosing internships and senior design projects that offer exposure to Six Sigma and Lean methodologies.

Perhaps the most difficult aspect is to evaluate the relative merits of the variety of certificates available. We direct the students to a web site developed by *The Council for Six Sigma Certification*[10], which is the most prominent and reputable agency for accrediting certifying agencies. We maintain a handout of web sites that contain current Lean and/or Six Sigma Body of Knowledge (BOK) and certification requirements and costs for the most popular types of certifications. One example can be seen at www.asq.org/cert/six-sigma-black-belt/bok. We emphasize that the most credible Black Belt and Master Black Belt certification programs require passing a written exam encompassing questions based on the specific body of knowledge as well as completion of one or more projects.

However, we make the students aware that Black Belt certifications can be earned without satisfying the real-world project requirement. We emphasize the value of conducting real-world projects using the DMAIC method. We encourage students to try to obtain internships and senior design projects that offer exposure to Six Sigma and Lean methodologies. Finally, we have recently offered a new industrial engineering technical elective titled Lean Six Sigma in which students completed an in-house project based on the DMAIC methodology.

Collecting Feedback from Alumni and Employers

We are able to give students additional guidance on the potential value of quality certifications in fields such as Lean or Six Sigma by obtaining feedback from alumni and employers. As part of our ABET accreditation efforts, the School of Engineering as a whole has conducted alumni and employer surveys for many years. The results of the alumni surveys conducted by students enrolled in our Introduction to Industrial Engineering and Introduction to Industrial Management courses (ISE 288 and IDM 288) are posted on the course web site (given written permission from interviewee). The quality interview conducted by students enrolled in ISE 327 or ISE 491 or ETM 627 concentrates on a specific employer's quality practices and includes a question about Lean or Six Sigma training and certification recommendations. By compiling the results of

written surveys obtained over a number of years, we have developed a rich data set of employee practices. In addition, we collect and share anecdotal evidence through in-person, phone, or email methodologies. We encourage students to ask about the potential advantages of Lean or Six Sigma certification when they talk to employers at the semi-annual university-sponsored career fair.

Presentations and Testimonials from Engineers and Managers

Another component of the certification guidance curriculum involves testimonials and presentations from career professionals. First, we maintain an annotated bibliography of magazine and journal articles [2,4,12] in which the authors discuss how obtaining certification influenced their career paths. Second, the first author uses sources such as LinkedIn to develop "alumni snapshots" of our graduates' career paths. The information that includes the graduate's career path (employer/job title/year), photo, degrees earned, and certifications obtained are compiled in a Power-Point presentation. In addition, these one-page snapshots are posted on bulletin boards throughout our school and, when permission is granted, are posted on the first author's web site. These alumni snapshots give indirect evidence of the perceived value of quality-related certifications. Third, we schedule periodic presentations by individuals who hire interns as well as full-time employees. The second author has developed a presentation highlighting the Six Sigma projects she conducted when she was a full-time quality engineer. The third author discusses what she looks for when she interviews job applicants for industrial engineering positions at RAFB. She also gives first-hand advice about the value of certifications listed on a resume, especially for graduates trying to obtain their first engineering position.

Conclusion

As the number of organizations offering certifications related to Lean or Six Sigma expands exponentially, it is becoming more difficult to judge the value of obtaining professional certifications in these areas. In addition, many organizations offer their own Lean or Six Sigma training tailored to their specific industry or current needs. Once a graduate is employed, he or she will likely be influenced by professional colleagues. However, engineering students who are trying to land a first job depend on guidance from their university. We have developed a mini-curriculum to help our students judge the value of obtaining quality-related certifications with an emphasis on decisions made before landing their first job. In the spirit of continuous improvement, we frequently update the curriculum and post new alumni interviews on the school's web site annually. We hope our students find this mini-curriculum to be a valuable addition to our ABET-accredited curriculum.

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Dr. Melinda Hollingshed is currently working as an Industrial Engineering Instructor at Mercer University. She is an American Society for Quality Certified Six Sigma Black Belt. Prior to working in academia, Melinda worked in the corporate world leading Lean Six Sigma projects for various manufacturing and distribution companies and training Green Belts. Melinda has also created online training courses to assist professionals looking to achieve American Society

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