

Lean Six Sigma for higher education

Over the past 25 years, Lean thinking and practices have been widely accepted by both public and private sector organisations, irrespective of its size and nature of the business as a process excellence methodology. Lean has been embraced by many higher education institutions (HEIs) at a global level to seek improvements in response to the demands of the higher education marketplace. These demands may include: meeting and even exceeding the expectations of students, reducing financial resources, reducing operational costs across the university sector and meeting the strategic objectives in a consistent manner.

Six Sigma, on the other hand, has not been widely adopted yet in many HEIs due to various challenges including: lack of quality data, lack of understanding of the benefits of Six Sigma methodology, fear of statistics, cultural barriers and misconception that Six Sigma is confined to the manufacturing processes which exhibit variation, and so on. The reality is different from above in the sense that many business processes in higher education sector do exhibit variation and it is important to reduce this variation for achieving consistency in performance. For instance, the turnaround time for making a decision on an applicant who is applying for a postgraduate research degree (e.g. MPhil, PhD or DBA) is important for the school as a significant delay might encourage the student to join another university or school. Although there are university guidelines or school guidelines for the turnaround time, it was observed that many universities do not pay much attention to this process and a number of potential customers are lost as a result of this.

Why Lean Six Sigma (LSS) has been adopted by many organisations today instead of using Lean or Six Sigma on its own? LSS can benefit from Lean thinking, particularly in the areas of elimination of waste and acceleration of process flow. Moreover, LSS can benefit from Six Sigma thinking, particularly in tackling problems with unknown solutions or chronic business problems where the previous solutions have not been effective. For these reasons, practitioners of Lean and Six Sigma started to develop the thinking towards a merger of the two approaches and LSS was born. The integration of Lean and Six Sigma methodologies provides organisations with the methods, tools and techniques for superior improvements.

A number of universities around the world have now started to integrate both Lean and Six Sigma for achieving operational excellence over the past four to five years. The guest editor of this special issue has founded the International Conference on Lean Six Sigma for Higher Education in 2013 with a clear vision to encourage wider academic community to deploy LSS. The purpose of such an international event was to share and exchange a number of research avenues on LSS in higher education. The conference has already attracted a number of academics, senior managers from various universities and other public sector organisations, researchers, business improvement managers in HEI and practitioners/consultants. It is quite clear that several universities in the USA (e.g. Purdue University, Missouri University of Science and Technology, etc.), the UK (e.g. Heriot-Watt University, Scotland; Cardiff Metropolitan University), India (Indian Institute of Technology, Chennai, India) and Saudi Arabia (KAUST) are pursuing active research on various LSS topics. A number of good quality publications have already been produced by various authors from such institutions with a greater focus on higher education.

The challenges facing LSS implementation in higher education have similarities with many other sectors which have embarked on the LSS journey. Traditional management practices of HEIs are focussed on the individual while LSS emphasises continuous



improvement through a team working and project-based approach. There are several other attributes which are involved in the value chain in the higher education like interest of the candidate, subject, course material, tutor or instructor, tutor's personality traits, tutor's skill set, prerequisites of the course, examination pattern, etc. Quantifying these attributes for data collection becomes a major challenge, as these are more qualitative variables.

This special issue on LSS for higher education has attracted a number of papers from various countries including the UK, USA, India, Singapore and South Africa making it very international and inter-continental. A total of seven excellent papers will be appearing in this special issue. This special issue has two papers on leadership: one is focussing on academic leadership and the other one on LSS leadership in higher education. I believe these two papers explicitly highlight the importance of leadership for the implementation and sustainability of any continuous improvement initiative in higher education context.

Thomas *et al.* present an innovative framework of LSS with a view to improving the effectiveness of curriculum design and delivery of a new undergraduate engineering programme in a UK higher education institute. The authors have utilised the use of Shainin's key variable search methodology to identify the key variables which are considered to be important in the curriculum improvement process.

Narayanamurthy *et al.* present the results of an action research on Lean thinking carried out over a period of two years in an Indian educational institute. The authors have shown the use of various tools to identify waste in higher education processes. The positive results obtained in this study can encourage other higher education institutes to tackle waste in various business processes using action research in higher education setting.

Anthony and Antony debate about the differentiation of academic leadership from traditional leadership. The authors have identified some commonalities as well as critical differences between the traditional and academic leadership in their study. It has been observed that there is a uniqueness centred on the culture, environment, structure and politics of an academic institution which many traditional leaders would not know how to work within. The authors wish to define and describe an academic leader as someone in a position to identify the need to change, to allocate resources to change, to actively manage and facilitate the change, to monitor and motivate during the change, and finally deliver change within higher education, both at the institutional level and the departmental/college level.

Laux *et al.* present a theoretical leadership model to overcome the current issues and challenges associated with process improvement initiatives such as LSS in a higher education environment. The purpose of the research was to identify characteristics of leadership which can be adopted in higher education. The authors propose a theoretical model on LSS leadership, which can help improve the quality of education, reduce non-value added costs and enhance operational efficiency of HEIs. The next stage of this research is to test the model in a HEI setting and make further refinements so that it can be implemented in other institutions.

Van der Merwe presents the effectiveness of Lean learning for students in a HE setting via a simulated working environment. The author has argued that many students from rural areas in one of the universities in South Africa pursuing Industrial Engineering Programme have very little or no exposure to the use of Lean tools and techniques. The simulated exercise has proven the fact that students who go through the experiential learning have a better understanding of the fundamental concepts and relevant tools of Lean compared to those who were not exposed to the exercise.

Laux *et al.* present a conceptual framework integrating Six Sigma with Big Data Analytics for the improvement of student success at a US public university. The paper further examines Big Data and Six Sigma in an interdisciplinary effort, an important contribution to Six Sigma but lacking a conceptual foundation in the literature. It was found that many HEIs are adopting Big Data efforts to better support their student centric mission of teaching and learning, key performance issues for administration and management of HEIs.

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Huay and Low present a case study which aims to identify the key factors that facilitate the conversion of printed learning resources to e-learning resources in a HEL. The study also provides the managerial insights on the levers to engender the transformation from a traditional print learning resources model to leaning with digital e-learning resources. The authors argue that this is one of the first to apply Lean management principles in making sense of the transformation processes involved in the use of digital innovation in higher education context.

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