

LEAN THINKING IN INDIAN EDUCATIONAL INSTITUTIONS

N. Shivakumar
Dr. D. Brahadeeswaran

Abstract

Everything we do, whether in our personal life or work life, involves a process. Each process is made up of a series of discrete steps that include a defined beginning step, a defined end step, and multiple steps between the two. Educational Institutions are relying on multiple complex processes to accomplish their tasks and provide value to the customer. These processes occur at the administrative, instructional, and student learning levels.

Lean is a program of organizational improvement that empowers each and everyone in the institutions to increase their personal performance and job satisfaction through process improvement. Lean engages everyone in streamlining their work processes by identifying and eliminating the steps within the process that are wasteful, unnecessary, or may even prevent them from doing their job. In Lean, the focus of each process step is to add value.

This paper takes a first step toward connecting theory concerning Lean methodology and the practices in education institutions. The objective of this paper is to describe the concept of Lean and explain how Lean process improvement principles can help Indian educational institutions improve education delivery and student performance while simultaneously saving costs.

Keywords: *Lean, Process Improvement, Educational Institutions*

Introduction

Lean can be interpreted as an operations strategy; a way to design, transform and run any business maximizing customer value and reducing waste. Many manufacturing and some service businesses today are using lean management principles and practices as a means to improve business processes, which in turn improves productivity and competitiveness, and delivers greater value to end-use customers (Bowen and Youngdahl, 1998; Golland et al., 1998; Swank, 2003). The lean management system was initially developed by Toyota Motor Corporation (Ohno, 1988) beginning in the mid-1930s, with elements of the management system dating to the late 1800s (Kimoto, 1991).

While originally developed in manufacturing, Lean principles have proven equally applicable to service industries, including educational institutions. Educational institutions are organizations in which workers rely on multiple complex processes to accomplish their tasks and provide value to the customer. These processes occur at the administrative, instructional, and student learning levels. Thoughtful application of lean principles and practices results in many benefits, including higher quality products and services, stable employment, better customer focus, faster

response to changing market conditions, and higher asset efficiency. Lean continuously evolves, as it adapts to any new context it is applied to.

Literature Review

Antony (2012) states that, Lean implementation initiatives in the Higher Education context are in a relatively early stage compared to manufacturing, or indeed, other public sector areas.

Radnor and Bucci (2011) presented three common advantages experienced by organizations that undertook Lean initiatives: "creating an understanding of the need to change, revising processes and practices which had been untouched for years and engaging staff to enable them to challenge and question their working practices" (Radnor & Bucci, 2011, p. 9).

Universities and colleges have benefitted from Lean projects in a number of service areas including admissions, the administration of research funds, hiring, and nearly any functional area where multi-step processes can be simplified and focused on the needs of the users served by the organization (Balzer, 2010; Langer, 2011).

It can, therefore be inferred that Lean in educational institutions is in a nascent stage, implementations were fragmented (i.e., difficult to assess), and early adopters saw significant results for process improvement and employee engagement.

Research Methodology

Content analysis of secondary data like journals, books and various websites from the internet was conducted to formulate the concepts and recommendations.

Lean principles

The essence of Lean is delivering value to customers and continuously improving the ability to do this. In 'Lean Thinking' (Womack and Jones, 1996) five lean principles were put forward as a framework to be used by an organisation to implement lean thinking which are listed in Table 1.

Table 1: Lean principles

1. Value	<ul style="list-style-type: none"> • Any process that the customer would be prepared to pay for that adds value to the product. <ul style="list-style-type: none"> • The customer defines the value of product • Value-adding activities transform the product closer to what the customer actually wants • An activity that does not add value is considered to be waste
2. Value streams	<ul style="list-style-type: none"> • The value stream is the sequence of processes from raw material to the customer that create value • The value stream can include the complete supply chain

	<ul style="list-style-type: none"> Value stream mapping is an integral aspect of Lean
3. Flow	<ul style="list-style-type: none"> Using one piece flow by linking of all the activities and processes into the most efficient combinations to maximize value-added content while minimizing waste The waiting time of work in progress between processes is eliminated, hence adding value more quickly
4. Pull	<ul style="list-style-type: none"> Pull = response to the customer's rate of demand i.e. the actual customer demand that drives the supply chain Based on a supply chain view from downstream to upstream activities where nothing is produced by the upstream supplier until the downstream customer signals a need
5. Perfection	<ul style="list-style-type: none"> The journey of continuous improvement Producing exactly what the customer wants, exactly when, economically Perfection is an aspiration, anything and everything is able to be improved

Wastes in Educational Institutions Process and Tools

“Waste” is any activity or process that adds cost but negates value. There are 8 types of waste associated with Lean Management. All process waste irrespective of any industry can be categorized into one or more of these categories as shown below:

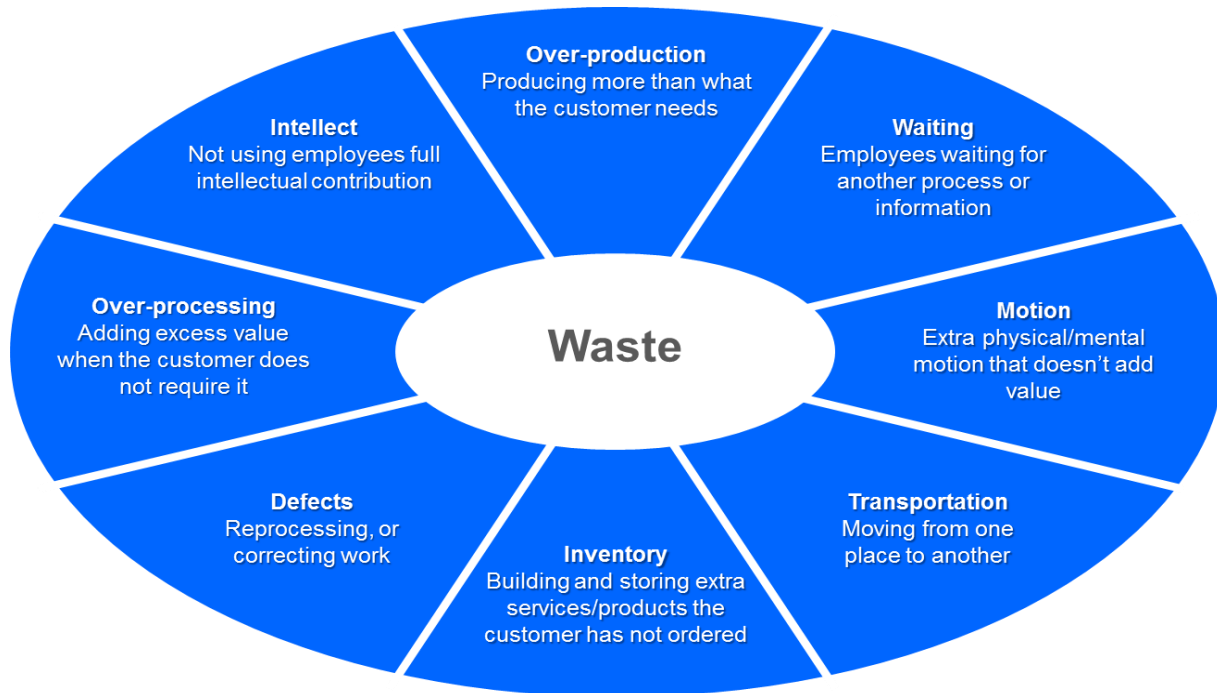


Figure 1: Eight Categories of Waste

The concepts of wastes in educational institutions should be looked at as something that is directional and should always be kept in mind while taking up a Lean optimization project. Appreciating waste in educational institutions can be quite challenging. What is needed is the usage of value stream mapping, which helps bring out the tacit wastes in a process. This has to be supported with sharp judgment of the change agents that are catalyzing the process improvements.

Table 2 shows the list of wastes which can be identified in the educational institutions processes and tools. This list has been developed by adopting the concepts presented by Lean Education Enterprises (Lean Education Enterprises, Inc, 2007). These wastes form an indispensable part of various Information flow processes in Education system such as Admissions, Teaching and Learning, Placements, Research and Development, Strategic Planning, Administrative Procedures etc.

Table 2: Wastes in Educational institutions

Wastes in Educational Institutions	Definition of the waste	How to identify in an institution	Where it can be found
1. Overproduction Effort	Producing more than what the customer's needs	<ul style="list-style-type: none"> • More information than the next process requires • More information than the parent, student or staff member needs • Making extra copies 	<ul style="list-style-type: none"> • Sending multiple information packets home • Redundant communications between staff and parent • Doing more than needed or than is valued
2. Waiting	Employees / Students waiting for another process or information	Waiting for... <ul style="list-style-type: none"> • The system to come back up • Copy machine, faxes • Parent/student/staff response 	<ul style="list-style-type: none"> • Interruptions • Confusing/conflicting information causing delay • Poorly run/scheduled meetings – late arrivals • Waiting for authorization to act
3. Motion	Extra physical /	<ul style="list-style-type: none"> • Searching for, storing, 	<ul style="list-style-type: none"> • Searching for

	mental motion that doesn't add value	retrieving files <ul style="list-style-type: none"> • Extra computer clicks or key strokes 	information or materials located far from the work area
4. Transportation	Moving from one place to another	<ul style="list-style-type: none"> • Taking files to another person • Handling paperwork 	<ul style="list-style-type: none"> • Transporting resources or information • Unnecessary moving due to disorganization
5. Inventory	Building and storing extra services / products the customer has not ordered	<ul style="list-style-type: none"> • Files waiting to be worked on • Unread E-mails • Unused/inadequately used facilities 	<ul style="list-style-type: none"> • Space not utilized well • Use/misuse of materials • Obsolete books/equipment/stored information
6. Defects	Reprocessing, or correcting work	<ul style="list-style-type: none"> • Data entry error, corrections • Missing information, lost records • Missed specifications/requirements 	<ul style="list-style-type: none"> • External / internal e-mail requirements • Training on technology/tools used • Failure to meet deadlines
7. Over-Processing	Adding excess value when the customer does not require it	<ul style="list-style-type: none"> • Repeated manual entry of data • Use of outdated standard forms • Use of inappropriate software/tools • Creating too many reports which no one reads 	<ul style="list-style-type: none"> • Duplicated or unclear roles and responsibilities • Report card compilation and publishing • Inspections
8. Intellect	Not using employees full intellectual contribution	<ul style="list-style-type: none"> • Must wait for management before can make a decision on basic tasks • Under or over utilization of people's 	<ul style="list-style-type: none"> • Don't use people's talents, skills, and passions • Too many meetings without outcomes

		skills • Not soliciting or listening to other ideas	• Staff frustrated with inefficient processes
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Lean Processes and Tools

Lean emphasizes the learning by doing approach, where the members of a process improvement team are those who are closely associated with adding value to the product. The whole process is based on defining customer value, focusing on the value stream, making value flow, and letting customers determine the product or service they want, with a relentless pursuit of perfection in a timely manner at an appropriate price.

We identify the value stream as a process, or series of steps, from concept to launch to production, and then the order to delivery and the disposition; in other words, from the raw materials to delivery of the finished product to the customer. Value stream steps can be value added, non-value added, or non-value-added-but-necessary. Lean emphasizes the elimination or reduction of steps that do not have value. We start with the customer’s request, strive for no interruptions or waste, avoid batch processing, and strive for smooth just-in-time one-piece flow.

Figure 3, the House of Quality/Lean building blocks is a good place to start looking for various tools which would be relevant for educational institutions to start the Lean Optimization initiatives.

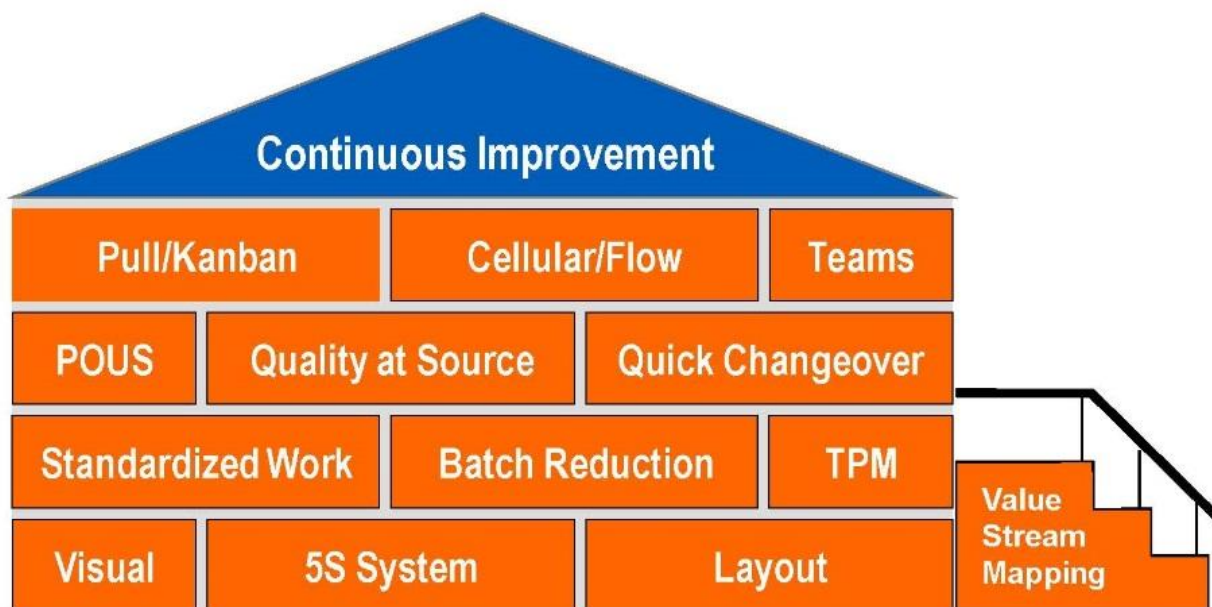


Figure 3: House of Quality/Lean Building Blocks

Some of the key processes and tools which are relevant to educational institutions are presented in Table 3 (Imai, 1997; Rother and Shook, 1999; Emiliani et al., 2003). The intent of these processes and tools are to simplify work, improve quality, reduce lead-times, and focus people on value creating activities.

Table 3: Lean Processes and Tools

Lean process or tool	Explanation	Use in Educational Institution
1. 5S System	Stands for: Sort, Sweep, Straighten, Shine, Sustain. Important for establishing an organized workplace.	A systematic process to organize and standardize the classrooms, office, bookstore, cafeteria, etc
2. Visual	Signs and other forms of visual information used to simplify the workplace.	Allows teachers and staff to visually observe measures and standards in their own areas : classrooms, office, lab, facilities maintenance, student evaluations, etc.
3. Value Stream Mapping	Visual representation of material and information flows. Used to identify improvement opportunities and eliminate waste.	The entire educational institution's flow consisting of individual processes in registration, book ordering, delivery of the teaching material, meetings, planning, scheduling, transportation, etc.
4. Total Productive Maintenance (TPM)	A regular maintenance program to ensure that tools are in good operating condition and available for use when needed	Equipment maintenance of office equipment, tools and software to reduce the incidence of "unscheduled downtime".
5. Continuous improvement (Kaizen)	Kaizen literally means "change for the better", also interpreted as "continuous improvement".	Teams / teachers to create and develop continuous improvement results that impact the success of the education or system. Continuous improvement techniques used by the users of each process where the knowledge resides.

The application of lean principles and practices in education institutions is an opportunity to better understand value from both students', teachers' and management perspectives. Both students and employers' Voice of the Customer should be incorporated in balance with the

knowledge areas that the Professor believes must be presented in the course to achieve the desired learning outcomes, and consistent with accreditation and institution requirements.

Suggestions and Recommendations

Lean is simply an operational set of knowledge-based tools that allows for identification and elimination of waste in any process or combination of processes to improve efficiency and add value. Lean requires a culture change in how everyone thinks on a daily basis, and is a long term journey of continuous improvement. Lean requires a high level of organizational investment, including an investment in culture, to ensure success. The facilitators for this process are the staff, technology, the infrastructure and mainly the vision and mission of the educational institutions. Lean practices will help educational institutions to eliminate waste; they also involve lot of hard work by empowering people with responsibility and ownership.

Few recommendations for Indian educational institutions that are considering or pursuing Lean implementations:

1. **Executive Leadership:** Top-level executives can be instrumental in creating a culture for continuous improvement. Executive sponsors need to increasingly understand complex phenomena such as Lean and the education institutions to understand how it fits the short and longer-term goals. Ensuring a culture of trust will be a primary objective to encourage initiatives of this level of complexity. Management, Dean and Professors'/teachers' have to build a culture where everybody is involved with continuous improvement every day.
2. **Project Governance:** Project governance is the framework which ensures the project has been correctly conceived and is being executed in accordance with best project management practice within the wider framework of the firms of organizations governance processes. Effective project governance ensures projects deliver the value expected of them.
3. **Knowledge Management:** Lean implementations provide a fresh opportunity to consider how the organization handles knowledge management: from the "easy" (document management or storing of policy) efforts to the "difficult" efforts (succession planning, knowledge transfer or competency mapping).
4. **Information Technology (IT):** Empowering all managers, Professors'/teachers' and executives to use information provided by information systems, implement creative

problem-solving, and share in the success of meeting goals will be the key to the success of lean implementation in education institutions.

5. **Training and Development:** Lean implementations involve significant training for staff and should include the organizational learning philosophy and information about how Lean integrates. Visualizations may be effective in conveying understandings about Lean and the learning organization.

Conclusion

Lean is simply an operational set of knowledge-based tools that allows for identification and elimination of waste in any process or combination of processes to improve efficiency and add value. Lean requires a culture change in how everyone thinks on a daily basis, and is a long term journey of continuous improvement. Lean requires a high level of organizational investment, including an investment in culture, to ensure success. The facilitators for this process are the staff, technology, the infrastructure and mainly the vision and mission of the educational institutions.

Lean practices will help educational institutions to eliminate waste but involves lot of hard work by empowering people with responsibility and ownership. A common error is the introduction of Lean as a means of reducing costs—this is not what the methodology is about and it does not necessarily result in cost savings. Institutional leaders need to remember, “the time to embrace Lean thinking is before an organization faces a crisis and needs to change” (Womack & Jones, 1996)^[13].

References

1. Antony, J. (2012) “Lean Six Sigma for higher education institutions (HEIs): Challenges, barriers, success factors, tools/techniques”, *International Journal of Productivity and Performance Management*, Vol. 61, No.8, pp.940-948.
2. Balzer, W. K. (2010). *Lean higher education: Increasing the value and performance of university processes*. New York: Productivity.
3. Bowen, D. and Youngdahl, W. (1998), “Lean service: in defense of a production line approach”, *International Journal of Service Industry Management*, Vol. 9 No. 3, pp. 207-25.
4. Emiliani, M.L. Bob(2004) "Improving Business School Courses by Applying Lean Principles and Practices".
5. Goland, A., Hall, J. and Devereaux, C. (1998), “First National Toyota”, *The McKinsey Quarterly*, Vol. 4, pp. 59-66.
6. Imai, M. (1997), *Gemba Kaizen*, McGraw-Hill, New York, NY. Individual Development and Educational Assessment Center

7. Kimoto, S. (1991), *Quest for the Dawn* (originally published in Japanese as *Yoake E No Chosen*), The Dougherty Company, Milwaukee, WI.
8. Lean Education Enterprises, Inc., "The 9 wastes in education, 2007", available at: www.leaneducation.com/whitepaper/9-wastes-in-education.pdf (accessed May 3, 2015).
9. Ohno, T. (1988), *The Toyota Production System*, Productivity Press, Portland, OR.
10. Rother, M. and Shook, J. (1999), *Learning to See*, Lean Enterprise Institute, Brookline, MA.
11. Swank, C.K. (2003), "The lean service machine", *Harvard Business Review*, Vol. 81 No. 10, pp. 123-9.
12. Womack, James P. and Jones, Daniel T., *Lean Thinking*, Simon & Schuster, 1996

About the Author

Mr. N. Shivakumar is Consultant, Global Consulting Practice, Tata Consultancy Services, & Research Scholar at National Institute of Technical Teachers Training and Research. He is pursuing research on Educational Policies with (NITTTR) Chennai: nshivakumar@hotmail.com

Dr. D. Brahadeeswaran is Former Prof & Head, Department of Policy Planning and Educational Research, National Institute of Technical Teachers' Training & Research (NITTTR), Chennai and is the Research Supervisor of Shivakumar: unnamala1947@gmail.com