

Editor's Welcome

Lean Innovation: The Art of Making Less Into More

Written by: Ela Malkovsky, Editor-In-Chief

Continuous improvement in business is about more than just a set of operational principles to increase efficiency. It is a mindset, and a corporate culture that is always geared towards finding better, more innovative solutions and gaining more value with less resources. At the same time, innovation also requires the ability to seek and leverage new opportunities for financing, commercialization, and business growth in order to sustain the R&D activities and to provide employees with the resources they need to stay ahead of the curve. Since resources in any company are always limited, achieving the optimal balance between business development and R&D efforts is a constant challenge for businesses across various industries and stages of growth. SR&ED tax credits and Lean Six Sigma management practices are two major resources that can maximize existing business and innovation efforts, regardless of industry or company size, thereby helping companies maintain a balance between performing R&D and financing their business.

Lean Six Sigma is a proven method to reduce costs and increase value. Since its inception in the automotive industry, it has evolved to become a methodology that is adaptable and adds value in various industries and in companies of all sizes. Lean Six Sigma can prevent major losses in start-ups, increase innovation in large companies, and help manufacturing and transactional businesses adapt to rapid changes in consumer demand. Furthermore, Lean Six Sigma methodology corresponds well with SR&ED tax credits and can in fact enhance R&D efforts.



As with filing for SR&ED tax credits, Lean Six Sigma implementation requires corporate commitment and leadership in order to succeed. Effective Lean Six Sigma leaders instill a corporate culture of innovation that derives from a continuous improvement mindset. Although this can be quite challenging as companies contend with daily business demands and employee reluctance towards change, ultimately, the return on investment in SR&ED and Lean Six Sigma initiatives can translate into more money, more time, and more innovation.

JIT, TPS, and the Roots of Lean Six Sigma

Lean Six Sigma is a management methodology that was preceded by the 'The Ford System' and the 'Just-In-Time' (JIT) system that were developed to increase value in automotive manufacturing. Henry Ford developed the 'The Ford System' for producing the Model-T by arranging all the machines, tools, employees, and products in one continuous system to eliminate activities that wasted time and resources.

Later on, Tiichi Ohno developed the JIT system using many ideas from the 'Ford System'. The success of the JIT system inspired many companies to adopt and grow the lean management principles, including the famous Toyota Production System (TPS), developed by Taiichi Ohno and Eiji Toyoda between 1948 and 1975. Today, the principles of JIT and TPS have been adapted to suit various industries through the Lean Six Sigma method, which has become established worldwide as one of the most effective management tools for improving overall customer value and increasing efficiency.

Guest Editor Spotlight

Henry Foppoli, P.Eng

As an Engineering Manager at NorthBridge Consultants for over five years, Henry manages a team of government funding specialists and assists clients in various industries such as automotive, plastics, tool and die, civil engineering, pulp and paper, oil and gas, and food. He believes that the most rewarding part of his job is helping clients become more profitable in a very competitive business environment, followed closely by ensuring that clients can maintain and increase their workforce with the help they receive from Government Funding.

Henry's expertise is rooted in his extensive academic and corporate training. He not only holds a Bachelor's degree in Industrial Engineering with a P.Eng. License from the PEO (Professional Engineers of Ontario) but has also acquired Lean Six Sigma Black Belt accreditation from the Schulich School of Business, which enables him to offer Lean Six Sigma coaching services.

He draws from his corporate experience as an Operations Manager for an Ontario-based company in the plastic industry, as well as his background in the automotive and telecommunications industries having worked for Ford Motor Company and a company that focuses on data transmission through optical fiber networks.

Born and raised in Buenos Aires, Argentina, Henry arrived in Canada 13 years ago to study at university. He was offered a lucrative position in the industrial engineering field while finishing his studies and had fallen in love with Canada, so he decided to stay. In addition to dedicating a significant portion of his free time volunteering for a non-profit organization, Henry is an avid horse rider, when time permits, and also enjoys golfing, travelling and playing acoustic and electric guitar.



Lean, SR&ED, and Innovation

Written by: Henry Foppoli, P.Eng

Over the last century, Lean Six Sigma management principles have been successfully adopted by numerous companies of varying sizes and across diverse industries to gain an advantage in an extremely competitive environment by increasing efficiency through the elimination of activities that do not add value. The strategic elimination of waste that is involved in transportation, inventory, defects, employee motion, idle time, overproduction, over-processing and non-utilized skills can provide companies with improved efficiency, technology, and services, while also reducing cycle times and operating costs.

Lean Six Sigma constantly challenges the current state of processes in order to eliminate non-value add activities (waste), progress to the next level, and innovate a process or a product. In doing so, companies frequently have to undergo technological uncertainties and obstacles that can only be addressed by means of experimentation, which is where Lean Six Sigma overlaps with innovation and SR&ED.

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The SR&ED policy is outlined by a five-step framework for performing experimental work which is grounded in the scientific method of problem solving. This includes developing the most logical and simple assumptions to explain or prove unknowns, and performing experimentation to test those assumptions. Lean Six Sigma implementation can strengthen and streamline SR&ED activities and application processes to provide applicants with a better return on their SR&ED time investment. When leveraged effectively, these resources can provide companies with a significant competitive advantage and enable them to maintain a high ongoing level of efficiency and innovation.



Business Innovation 'Tool Box'

Lean Six Sigma offers a wide and flexible 'tool box' that can suit all types of industries. All processes, regardless of the type of industry they belong to, have points where they can be improved. For example, one of the core Lean Six Sigma strategies, the 'Define, Measure, Analyze, Improve and Control (DMAIC) method is a data-driven quality cycle for improving processes, which is applicable to all types of businesses. What will differ from one company to another is the type of tool that is more convenient for each situation, but the DMAIC method remains the same.

Another crucial Lean Six Sigma method, 'Design of Experiment' (DOE), is highly effective at ensuring that experiments are laid out in accordance with the scientific method, and in compliance with the five-step SR&ED eligibility criteria outlined in the CRA policy. This tool is also useful for maintaining contemporaneous records of all the hypothesis testing performed by the claimant, which is becoming increasingly important for demonstrating SR&ED project eligibility.

Business Innovation Culture

The role of employees is crucial in Lean Six Sigma implementation. The Toyota Motor Corporation, a champion of Lean management principles, is well known for recognizing this by insisting that "Before we build cars, we build people." This came from a core belief shared by many corporate leaders that developing your people can add tremendous value to your organization. This means not only providing employees with the resources that they need, but also developing a culture that challenges the employees and encourages problem solving and innovative ways of thinking.

Many Lean companies have implemented the Plan, Do, Check, Act (PDCA) cycle as a core principle for improving processes or products and growing an engaged, problem-solving workforce that is better able to stay ahead of the competition through innovative critical thinking. Furthermore, since the PDCA cycle is based on the scientific method, which consists of a hypothesis (Plan), experimentation (Do), observation (Check) and adjustment of hypothesis based on conclusions (Act), it is therefore highly compliant with SR&ED policy.



Adapting to Changing Market Demands

The Future of Lean Six Sigma Manufacturing

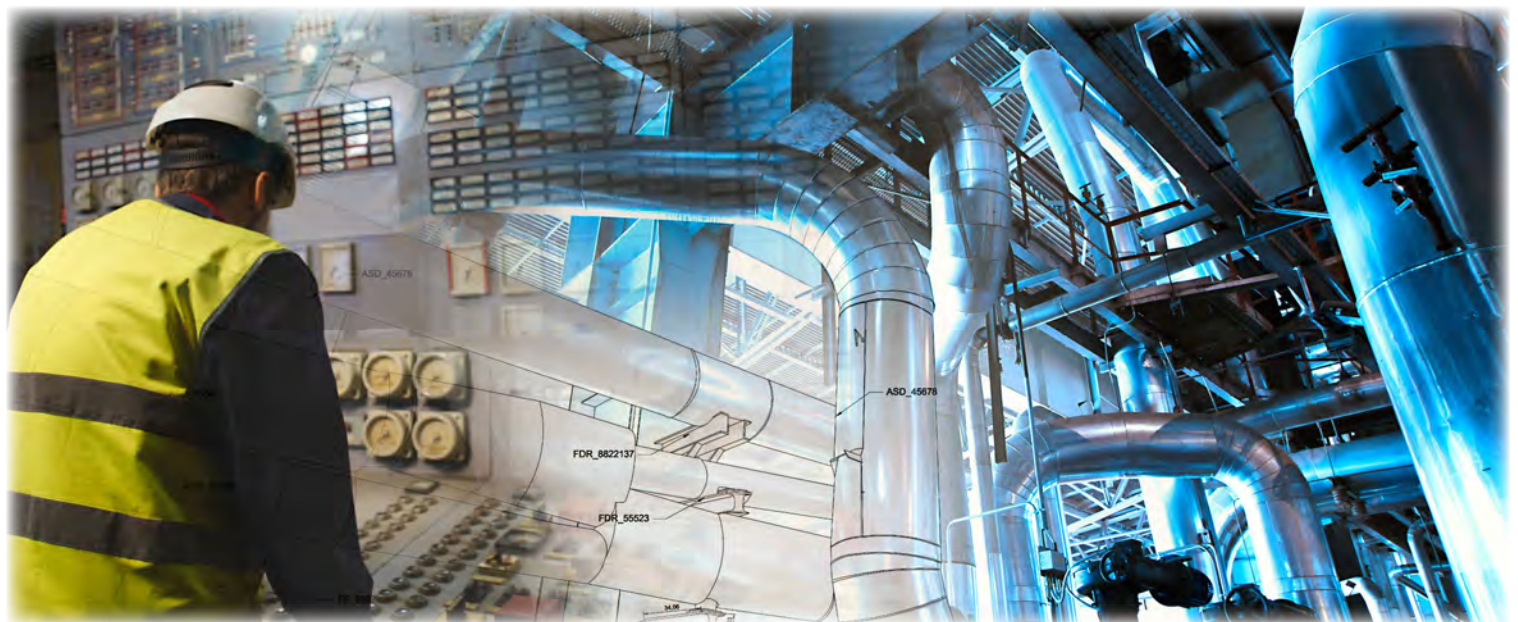
Lean Six Sigma management philosophy was born in a manufacturing sector from the realization that much time and resources are wasted on transportation, unnecessary movement, idle time, defects, over-processed goods, overproduction and inventory. Therefore, continuous improvements can be achieved by eliminating sources of waste. As a result, numerous large manufacturing companies have significantly improved production speed and efficiency while maintaining high product quality through the implementation of Lean Six Sigma management practices.

Embracing Advancement in Technology

Now more than ever, organizational efficiency in developing new innovative solutions is crucial for maintaining a competitive edge and meeting rapidly changing market needs for on-demand, customizable products and services. From the Internet of Things to 3D printing, recent technological advancements have created new possibilities for innovation. The impact on the manufacturing playing field is infinite in terms of driving market trends, intensifying corporate competitiveness, and reshaping supplier-manufacturer-consumer dynamics.

Reducing the Cost of Quality

The implementation of Lean Six Sigma manufacturing methodology can help companies integrate new technologies and meet a growing market demand for customization to achieve higher quality and value for the customer at the lowest possible cost. It integrates the consumer into the development phase and provides an effective method of allocating improvement expenditures by defining the value of improvement efforts, identifying technological strengths and weaknesses, and prioritizing quality problems for the organization as a whole.

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Creating Value in Transactional Businesses

Written by: Gerry Fung, P.Eng

Lean Six Sigma emerged in a manufacturing environment, but there is a growing trend of companies in the transactional industry implementing Lean Six Sigma practices. A wide variety of businesses including banks, insurance companies, hospitals, hotels and even businesses in the tourism, retail and education sectors have experienced significant financial benefits from Lean Six Sigma implementation. This trend can also be observed by the growing tendency of these companies to allocate resources for coaching their employees in Lean Six Sigma practices.

Lean Six Sigma in the Transactional Industry

As the transactional industry grows, so too does the demand for improved transaction speed and quality; however, the most challenging aspect of implementing Lean Six Sigma in transactional settings is the lack of quantitative data that is normally utilized at the 'Measure' stage of the DMAIC method. Another challenge in the transactional industry is the existence of many hidden processes (also known in Lean as 'hidden factories') that may not necessarily add any value to the final service delivered to customers. The implementation of the Lean Six Sigma methodology is becoming especially useful for increasing transactional efficiency and helping companies meet a demand for increased transactional speed by quantifying processes, as well as by identifying these 'hidden factories' such as operations that are not evident until the process is carefully analyzed with a detailed process map. In these 'hidden factories' many unnecessary reworks and check points take place with further detrimental consequences to the fast flow of information, which is the raw material and work in process of transactional businesses.

Lean Six Sigma Innovation in Information Technology

Information Technology (IT) has traditionally supported business; however, due to the prevalence of computer-based transactions and electronic commerce, IT is quickly becoming a crucial component of the service offering. Lean IT identifies and removes waste that contributes to poor customer service, higher costs, and employee inefficiency through the specific targeting of contributing factors including: defects (bugs), overproduction (development of unnecessary or redundant applications), waiting (slow application response times), non-value added processing, transportation (on-site visits to resolve hardware issues), excessive inventory (under-utilized hardware, under-utilized development teams), excessive motion (resolving recurring problems), and unused employee knowledge.



Lean Six Sigma Innovation in Software Development

Although the origins of lean principles come from production, they can be extended to disciplines such as software development. Software Development differs from manufacturing production, in that it involves making a single product, whereas manufacturing production traditionally involves repeatedly reproducing the same product while minimizing variation. Although there is a fundamental difference between the two activities, the high-level notion of reducing unnecessary waste is highly applicable to software development. The principles of lean software development were introduced by Mary and Tom Poppendieck, who extended Lean principles to include: eliminating waste, amplifying learning, deciding as late as possible, delivering as fast as possible, empowering the team, building integrity, and seeing the whole. The paradigm of Agile software development adheres to these principles. An Agile software development approach involves cross-functioning teams of developers working on small increments ("sprints") that allow for problems to be identified, and for customer and stakeholder feedback to be incorporated before running the next sprint. In this manner, crucial decisions can be delayed until customers have realized and better communicated their needs, which allows for adaptation to changes and the prevention of costly early decisions.



Preventing Financial Losses in SMEs and Start-Ups



Inspired by the high efficiency of large lean companies, small- to medium-sized enterprises, including start-up companies, have been adopting Lean Six Sigma management principles in order to develop high value processes with minimal waste right from the start. This allows companies that have very limited resources in the early stages of growth to prevent major future losses, develop high efficiency, and accelerate the commercialization of their innovations.

Eliminate Waste Before it is Created

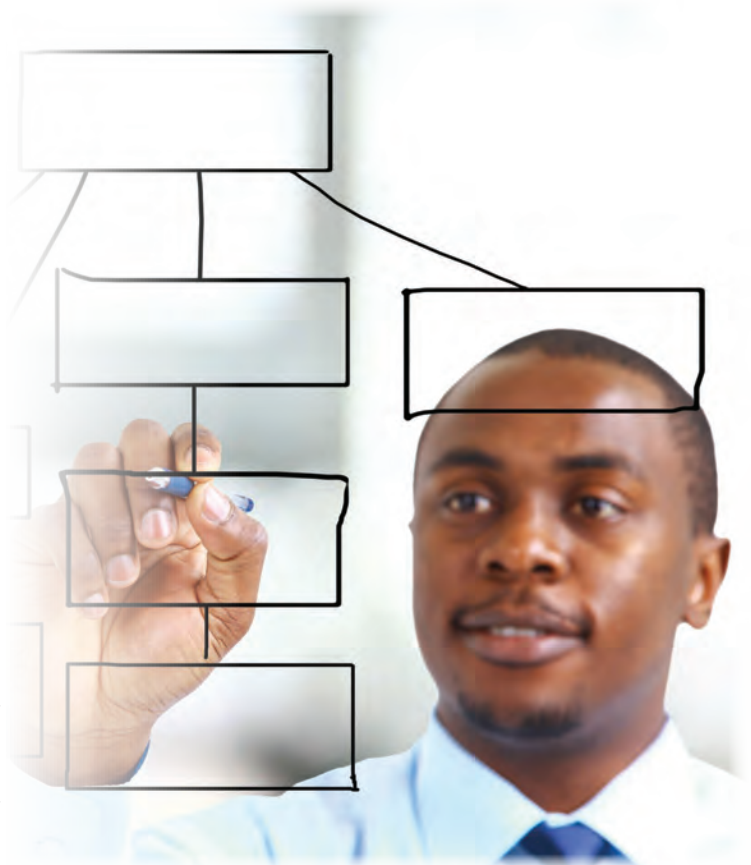
The major advantage of implementing Lean Six Sigma in start-ups is that ineffective business practices can be detected right from inception and the right solutions can be developed to eliminate them, before they end up accruing costs. Lean Six Sigma implementation can further prevent financial losses through agile product testing and revision cycles based on a 'customer development' approach that involves rapid development and feedback on a Minimally Viable Product (MVP). By eliminating wasteful operations or features and determining further value-add improvements early in the product development cycle through interaction with the customer, this approach can provide companies with significant savings by securing market demand before investing major resources.

Avoid Failures Before They Occur

In the case of established companies, processes are well known and can be laid out by Lean Six Sigma tools such as a process map, a value stream map or a SIPOC (suppliers, inputs, process, outputs, and customers) diagram. These tools can be also used by start-ups to increase efficiency; however, for new companies, the FMEA (Failure Mode & Effect Analysis) tool will be most useful at an early stage. FMEA is a powerful method for preventing significant financial losses by analyzing the process that the company plans to implement, or has recently implemented. This can be critical for the success of start-ups that lack the experience and data of running a process for several years.

Create Value and Maintain Quality

Establishing a Lean Six Sigma company structure that emphasizes the role of the end user early in the development process can help companies in the early stages of growth to gain a significant market share by ensuring that there is demand for their products or services. Furthermore, it allows companies to establish product specifications in the early stages of product or process development for maintaining ongoing quality standards that meet customer quality expectations. In addition, Lean Six Sigma implementation enables small companies to quantify their business approach and efficiency improvement results to meet investor/shareholder expectations and secure financing, allowing the business to grow and make further investments in innovation.



Enhancing Innovation in Large Companies

One of the main challenges currently facing large established companies is maintaining a balance between achieving incremental product/service improvements with existing products/services for growing the current target market, while also exploring opportunities for more radical and disruptive innovations to capture new markets and expand the capabilities of the company. Lean Six Sigma implementation can strengthen innovation efforts in large companies by providing a highly efficient structure for executing innovation efforts that will not impact ongoing research and development efforts.

Address Dual Business Objectives

Many established businesses struggle to maintain the same level of innovation that is achieved in smaller, start-up companies. This is because the organizational architectures required for small and large companies are fundamentally different. Small innovative firms are characterized by a loose decentralized company structure with a faith-based experimental culture that is agile, flexible to change and geared towards radical and disruptive innovations. Meanwhile, large established companies require a centralized, evidence-based and efficiency-oriented culture in order to enhance efficiency and quality through incremental improvements. As a result, large organizations often exhibit an 'innovation inertia' that prevents them from embracing new opportunities as they may require new or revised business models, thereby, impacting the company's ability to compete in a rapidly changing market.



Create Organizational Ambidexterity

A growing number of large companies are utilizing Lean Six Sigma management principles to implement Lean start-up methodology into their existing infrastructure and create a hybrid, or 'ambidextrous', company structure which can meet dual business objectives for incremental process improvements and radical disruptive innovations. This allows companies to bypass the challenges of a large and complex corporate structure to establish financial and timeline requirements that better reflect the flexibility and agility of Lean innovation projects. This can help large companies to compete with smaller firms, while continuing to improve existing products and services.

Invest in Employee Motivation

Employee engagement in innovation initiatives is the most critical factor for successfully implementing Lean Six Sigma principles; however, getting employees on board when introducing changes can be especially difficult in large and mature companies. In order to effectively implement change in large companies, a shift in mindset is first needed to develop a corporate culture of innovation that becomes rooted in daily thoughts and activities. Most importantly, employee motivation and engagement has to be driven by a managerial commitment to innovation and a continuous improvement mindset.



Lean Innovation Leaders

Today's business leaders face a range of challenges from domestic and international competition to changing consumer needs and global economic turmoil. The demand for innovation, both on the shop floor and in the board room, is strong, meaning that companies must develop new products/processes as well as new business models in order to meet customer demand and overcome economic uncertainty.

Above all, effective Lean Six Sigma innovation leaders build abilities and motivation in employees by demonstrating a continuous improvement mindset which emerges from being present in the center of action and developing a thorough understanding of the customer and the value stream.



Lead from the Center of Action

The Gemba walk is one of the fundamental principles of Lean Six Sigma management strategies, which stresses going to the center of action to observe, understand and learn. While the idea of Management By Walking Around (MBWA) is not new, the Gemba walk as defined by Taiichi Ohno, a pioneer of Lean methodology, directs leaders to look for waste and improvement opportunities, understand the value stream, and build relationships with employees. The Gemba walk allows leaders to directly observe process standards during operations, assess the conditions of the space and equipment, and analyze safety hazards. This enables leaders to make practical improvements that will create value for the processes and improve operational conditions for the employees.

Respect the People

Respect for employees and partners is a central principle of the Lean Six Sigma philosophy which, above all, regards people's ability to think, and stems from a fundamental understanding that building people adds infinite value to an organization. Defining this principle in his book titled Workplace Management, Taiichi Ohno explains that "In order to lead a large number of people, you have to be tough when it comes to work. However, I think this is basically not a matter of giving orders or instructions, but a competition of wits with subordinates...And if you lose this competition of wits, you have to swiftly admit it." This comes down to the belief that leadership engagement with employees through a problem solving process is actually the highest form of respect as it demonstrates to the employees that the manager requires their knowledge to understand the situation and determine the most effective solution. The principle of respect through mutual improvement extends to a company's network of partners and suppliers. Lean Six Sigma philosophy emphasizes respecting your extended network of partners and suppliers by challenging them and helping them improve with the goal of growing and benefitting together.

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