Lean 4.0 – Change management for a brave new world

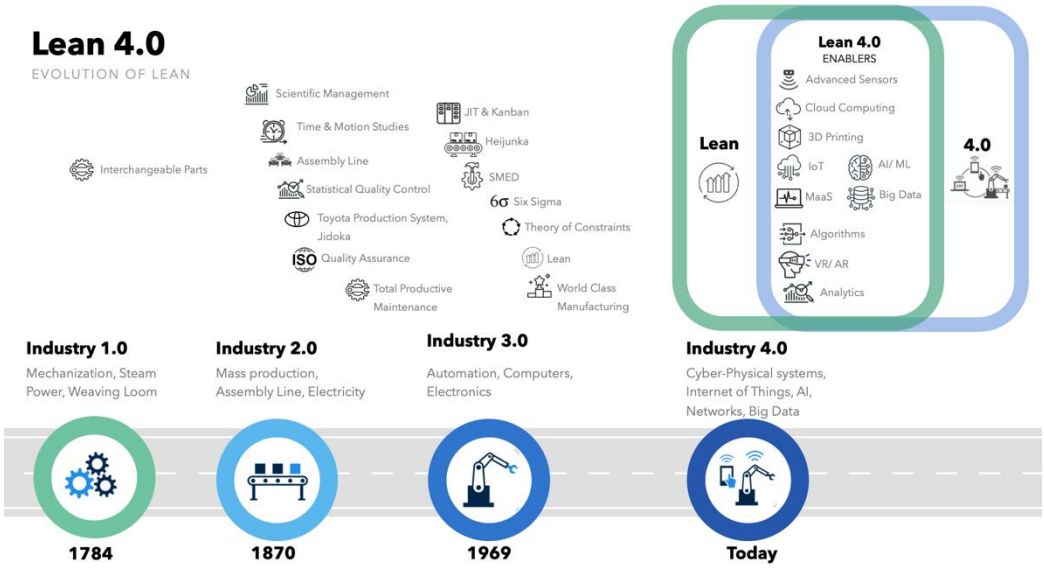
Ramesh Chandra – Altix Partner – Supply Chain

Abstract

Lean has had a long and storied history from the days of the first industrial revolution through the modern age of automation. Over the course of this period, there has hardly been an industry that has not been touched or transformed by lean. This article explores the relevance of lean today and examines the future of lean through the lens of digital technology landscape of the next industrial revolution.

Introduction

This year marks the 30th anniversary of the initial publication of The Machine That Changed the World, the seminal work by Womack, Jones and Roos that, for the first time, provided a comprehensive picture of the full lean system. We're also at the dawn of a new Industrial Revolution, referred to as Industry 4.0, one that driven by convergence of the cyber world of digital technologies and the physical world of operational industrial technologies. Consequently, Lean finds itself at a point of inflection yet again.



Lean, in a nutshell

The primary goal of Lean is to eliminate waste, the non-value-added components in any process, thereby reducing lead times, increasing flexibility, optimizing complexity, and improving productivity. Lean, as a management philosophy, achieves this through a blend of putting customers first (customer-centricity), standardizing processes, aligning an organization around shared goals, empowering frontline workers, and fostering a culture of continuous improvement.

How Industry 4.0 impacts Lean

Just as Lean is much more profound than an aggregation of useful tools and techniques, Industry 4.0 offers us a potential far greater than the sum of diverse digital technologies that currently define it. The combination of Lean and Industry 4.0 - **Lean 4.0** offers us tantalizing new opportunities at revolutionizing the end-to-end supply chain. Here are three prominent areas where Lean 4.0 is transformative, along with enabling technologies and description of associated implications for lean.

Agility

Our customer today is a "segment of one" – in other words, customers already demand and expect new products and experiences uniquely tailored to their individual needs. Further, they want them right away, at the lowest cost, they have a wide range of alternatives to choose from, and they have a wide array of public platforms to voice their opinion about products and services. This has serious implications for firms from the standpoint of managing supply chains through the resulting complexity in a cost-efficient way. The ability to recognize and leverage this complexity to their advantage would define success of firms in future.

The good news is that this new reality, in fact, plays into Lean's traditional strengths – relentless focus on continuously optimizing value streams around customer needs (think just-in-time and batch-of-one) with the end goal of providing the highest quality at the lowest cost in the shortest lead time. Industry 4.0 enables and unlocks the full potential of Lean and enable organizations to be truly agile and customer-centric through a suite of current and emerging technologies.

Advanced industrial internet of things (IIot) sensors, radio frequency identification (RFID), edge computing and robotics enable Lean tools like single-minute exchange of dies (SMED) to progress from concept to reality, facilitating rapid production line changeovers and thus greatly improving manufacturing flexibility. Digital Twins, which are digital clones of the physical engineering and manufacturing world, would substantially cut down cycle times to design, test, perfect and bring to market new and superior products. Additive manufacturing or 3D printing has evolved to a point where stronger, lighter, and geometrically complex parts can be rapidly prototyped and manufactured on demand.

Transparency and Trust

Lean is truly effective when it is supported by a framework of trust in data, systems, and relationships across the supply chain network. For instance, lean tools like Just-In-Time work only if planning processes are accurate and capable. Industry 4.0 offers solutions to radically improve data integrity, transparency of transactions, and end-to-end visibility of the supply chain.

Blockchain technology, a distributed and decentralized ledger for recording transactions among multiple parties in a verifiable and tamperproof way, has the potential to transform global supply chains by eliminating blind-spots in flows of information, inventory, and money. Edge computing devices deployed on the production floor give frontline workers and plant management access to high quality usable real-time operational information, while cloud-based computing infrastructure could provide unprecedented level of visibility across the entire supply chain.

AI-enabled predictive analytics based on "big data" from multiple streams could eliminate "gut-feel" based and siloed planning and promote more holistic, accurate and granular planning scenarios at rapid speeds, which could integrate, automate and optimize the business planning process to substantially lower supply chain costs.

Continuous Improvement

The twin pillars of Lean house - JIT and Jidoka (automation with human intelligence to ensure continuous quality monitoring at source), stand upon a foundation of stability, standard work, Kaizen (continuous improvement) and Heijunka (load leveling). Strong controls backed by a culture of process improvement is at the core of Lean. Industry 4.0 would be a game-changer in the range of possibilities it offers to further propel Lean to the next level of capability.

IIoT sensors and Machine Learning (ML) algorithms could help self-diagnose and self-repair production equipment, which could significantly improve predictive maintenance and equipment uptime, leading to maintenance of flow, a key objective of Lean. IIoT visual sensors and edge computing can also be employed to automate quality control, detect process abnormalities, pre-emptively shut down lines and reroute product within a facility to allow for maintenance while preserving flow. The Digital Twin could be employed to simulate failure scenarios to drive Poke-Yoke, the Lean tool to pre-emptively error-proof products, equipment, and processes. Use of Augmented Reality (AR)/ Virtual Reality (VR) for workforce training to deliver work instructions, and to remotely troubleshoot equipment would empower frontline workers with essential knowledge at their fingertips, improve worker safety and drastically cut down overall process and service cycle-times. The above innovations, in turn, would enable process standardization across the enterprise, improve process stability, and elevate Overall Equipment Effectiveness (OEE), the gold standard of manufacturing productivity.

Finally, the plethora of operational and transactional data generated through Industry 4.0 through a myriad of computing devices, in conjunction with AI/ML algorithms would promote the discipline of continuous improvement from an afterthought to the very core of how a business is designed and managed.

How Altix can help you

Altix brings decades of experience with successfully designing and implementing supply chain transformation projects in the U.S., Europe, South America, and Asia. Our team of industry veterans deeply understand both Lean and Industry 4.0 and can help you and your team deploy Lean 4.0 across your supply chain through proven and time-tested methods.

Industry research has demonstrated that deployment of Lean **in conjunction with, and parallel to** implementation of Industry 4.0 technologies would significantly **amplify** business results (up to 40% cost reduction) as compared to implementing them separately and independent of each other (15%-20% cost reduction).

Our seasoned consultants help and support your and your team through every stage of your Lean 4.0 journey – from assisting with developing a cohesive strategic blueprint, to designing and piloting specific use cases, to rolling out improvements at an enterprise scale, to maximizing your ROI, to helping you navigate through hurdles and avoid many of the traditional pitfalls of implementing similar initiatives.

The brave new world of Lean 4.0 awaits!

About Ramesh Chandra
Ramesh is partner in the Cincinnati office of Altix and senior supply chain consultant with over 20 years of leadership experience with designing and executing supply chain, logistics and product strategy for automotive, industrial, aerospace, transportation and retail giants across Asia, Europe, South America and the US. As a change leader, Ramesh has managed numerous global strategic and continuous improvement initiatives across full spectrum of supply chain activities. You may contact Ramesh by email at ramesh.chandra@altixconsulting.com.

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