Infor

Achieving lean success—A holistic approach

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Executive summary

Over the past decade, the concept of lean manufacturing production has gone through a dramatic evolution from an obscure and isolated practice to a mainstream, extensively publicized methodology that is well known throughout the manufacturing and supply chain industry. However, this does not mean it is entirely understood as a business practice, nor does it mean that it has been implemented to any large extent. According to an ARC Advisory Group's strategy report, "36 percent of manufacturers are using lean as their primary improvement methodology"[1]. Those numbers are likely to be representative of how many companies are applying lean principles in even a limited way and in at least one specific area of the company rather than actually using lean principles throughout the organization.

The challenge with the concept of lean is that it can mean different things to different people. When the word lean is used, many people think that the scope of lean is confined to the production side of the business. The production floor is of course where lean was first introduced. First in concept by Ford Motor Company with the assembly line and later refined in Japan by the Toyota Motor Company beginning in the 1950's. Called the Toyota Production System (TPS), it was defined as: "A philosophical approach to business that is based on satisfying the customer (whether internal or external) by producing quality products that are just what they need, when they need them, in the quantity required, using the minimum of materials, equipment, space, labor and time."

A common question that comes up in most discussions about lean is whether it is the tools and processes, or the people that make lean work. In reality it is both. Applying lean tools, new technology, and new business processes to a traditional silo-oriented culture will not work. Lean, at its core, is a cultural and people-oriented initiative. Key to making the transition to a Lean organization is the fundamental change in the corporate culture that must be made. Central to this change is the need for the cultural change to be driven from the CEO level of the company. There must be commitment from the top to establish a clear vision for all employees to understand the benefits to them personally as well as to the organization as a whole. In addition, the mindset of measuring performance must shift from measuring each individual department or discrete task to measuring performance across departmental boundaries, and measuring the end-to-end delivery of services and products across the organization. Although the movement must be driven from the top, the new culture should also focus on listening and learning from individual employees at all levels of the organization, and soliciting input and suggestions for improvement from those that are closest to each process within the company. To make this happen, there must be policies that encourage and reward employees to contribute to the continuous improvement of processes, including those that may not be directly under their control, but perhaps upstream or downstream from the work they are doing. The result should be a culture that fosters cross-departmental teamwork and communication up and down the organization.

[1] Source: ARC Advisory Group

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Another common question that often arises is whether or not lean is only about the plant floor. While the manufacturing and production floor aspect of a business offers the most tangible and significant opportunity to leverage lean methodologies, the same principles and philosophies can be applied across every aspect of the business. Lean principles can in fact benefit every department and business process, including engineering and design, project management, finance, human resources, purchasing and supplier management, customer service and customer relationship management, sales and marketing, quality assurance, and of course, inventory control, distribution and manufacturing. Today, more than ever, businesses recognize that business excellence and success extends beyond a single department or the boundaries of the internal organization. Every business is impacted by the influences of processes and demands outside of their own department or organization, whether in the form of suppliers, contractors, partners or customers. Market leaders recognize this fact and work to control and manage the effectiveness of their total supply chain.

An important facet to a lean initiative, as with any business process oriented initiative, is the effective application of technology. The speed, volume, and complexity of business transactions today, now dictates the use of technology to efficiently support communication and information exchange across departmental boundaries and across an organization's supply chain. Customer order and service requests can be submitted in more ways than ever before, including: phone, fax, email, web portal, and mobile devices. Additionally, the appropriate application of lean-centric technology can be used to eliminate the redundant entry of information from one department to another or in other cases could eliminate a step that traditionally required human intervention, and therefore time, such as issuing an automatic order acknowledgement. And lean-centric technology can be used to guide workers to the most appropriate work assignments, based on the newly established lean practices. In essence, lean tools and technologies offer an added level of efficiency and improvement to the business, and as technologies continue to be enhanced and created, there are opportunities for further lean initiative improvements as they are rolled out within an organization.

Nearly every process, internal and external, can be improved through lean principles. But what does it mean to be lean across all departmental functions inside and outside the organization, and how can an organization position itself to achieve lean business practices supply chain wide, and what are the critical elements each line manager needs to consider to support lean principles in ones area of responsibility. If the lean principles can be applied as a holistic approach throughout the entire organization, the potential pay-offs for such a company-wide lean initiative can be dramatic.

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The essentials of lean

In order to understand the opportunities for extending the lean philosophy across the entire enterprise, it is important to understand the guiding principles of lean and the elements that comprise a truly lean initiative. At its most basic, lean is a focus on greater operational efficiency, the elimination of waste throughout the organization, and continuous improvement. Some of the benefits include:

- Reduced lead times
- Improved delivery performance
- Increased sales revenue
- Lower operating costs and Increased profits
- Improved customer satisfaction and supplier relations
- Increased inventory turns and a drastic reduction in inventory
- Better employee morale and Increased employee retention
- Improved quality
- Creation of additional working capital for new projects
- Reduced physical space requirement

The process of satisfying the goals of efficiency, waste reduction and continuous improvement, however, can be a daunting task as it completely changes the way most organizations think about their business practices. And with all of the information that has been produced in recent years on the subject of lean, there are also a seemingly endless number of recommendations for how to achieve lean.

The basic concept surrounding the lean philosophy is to be able to do more with less. This means processing fewer transactions and with fewer resources, (including people, machine, material, energy, etc.), and only those that are essential to satisfying a customer order.

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Lean as a holistic approach

From a more formal perspective, lean has been defined through a variety of methodologies, tools and practices that can be considered essential to a lean initiative. Companies typically adopt one or more of these formal practices thinking they are now operating in a lean fashion. Unfortunately only adopting individual elements of lean will produce isolated improvements rather than long term results. Given that many lean concepts have originated from the Japanese culture, where balance, harmony, discipline, and group organization are central themes, it is not enough to only use the vocabulary and individual elements of the philosophy. It is the sum total of the elements and the synchronized relationship to one another that make them most effective. Likewise, it is the use and adoption of lean beyond one department such as manufacturing production control that make a lean initiative most effective. Rolling out an enterprise wide lean initiative can be viewed as having three essential layers: The business value stream layer, the business improvement layer, and the business strategies and tools layer.

Figure 1. Lean as a holistic approach requires discipline and attention to each layer of the lean philosophy, including the value stream, business improvement and an applied business strategy.

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The Business Value Stream Layer is aligned with the Womack and Jones' 1996 definitions of the five main steps to achieving lean transition for enterprises. These steps make up the base layer that sets the tone for how the company intends to serve its customers and differentiates itself from its competitors based on the processes that meet those customer needs and expectations. Central to this initial step is to define and optimize the way in which the company responds to customer demand and how it will add value and ensure customer satisfaction. Within this layer, the company defines this value stream through a cycle that includes the following steps:

- Defining value based on the customer's view point
- Map the value streams for all processes serving internal and external customers.
- Make the activities flow with efficiency
- Respond to customer demand
- Continuously improve (Kaizen) the processes based on feedback

The business value stream activities should precede the implementation of a business software system in order to ensure the practices and business flows are well understood and can be matched with specific business solution capabilities. Value Stream Mapping is the process of streamlining and optimizing specific processes or activities, such as order to cash, procure to pay, attract to perform, and accounting to reporting.

Once the value streams for each department are defined, the continuous improvement aspect is critical to ensure that the procedures are enhanced based on any customer, supplier, and inter-departmental issues that are uncovered. This continuous improvement activity is also called Kaizen, a Japanese term used to refer to continuous, incremental improvement of an activity that seeks to eliminate waste and inefficiency. Often times, companies will implement this philosophy as a series of event driven activities, known as a Kaizen event, which brings all owners and participants of a process together. The purpose is to conduct a formal review of the process, solicit feedback from the group, gain buy-in from team members and ultimately work towards process improvements that can help the organization achieve improved results by making enhancements to existing processes within the company. Kaizen literally means "change for the better" or "improvement", the English translation is "continuous improvement", or "continual improvement."

The Business Improvement Layer includes those elements that seek to uncover areas of improvement and enhancement, and support business excellence on a daily basis throughout the company. This includes six primary elements:

1) Eliminating Waste
2) The Five S's
3) Visual Cues (Kanban)
4) Documented Procedures and Instructions
5) Error Proofing
6) Six Sigma and Lean Quality

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The process of eliminating waste as defined in the context of the TPS model is outlined in terms of seven kinds of waste:

1) Over-production (Producing more than necessary)
2) Motion (of operator or machine)
3) Waiting (of operator or machine)
4) Conveyance (movement of material)
5) Processing Itself
6) Inventory (raw material)
7) Correction (rework & scrap)

These forms of waste are manufacturing production focused for the most part; however the concepts can be applied to many other areas of the business as well. In the supply side of the equation, the goal is to minimize the procurement of material, as well as reducing the time and cost while also minimizing returns and quality issues. On the demand side the goal is to have the ability to deliver products faster, with increased quality, at lower costs, when and where customers want them. Areas that have had less attention from a lean initiative point of view, but also provide the opportunity to improve efficiency, eliminate waste and lower operational costs include: Customer and Supplier Relationship Management, Quality Assurance, Accounting, and Sales and Marketing Automation.

The five S's is a methodology for organizing, cleaning, developing, and sustaining a productive work environment in order to create a workplace that is more organized and efficient. The rationale behind the five S's is that a clean workspace provides a safer, more productive environment for employees and promotes good business.

The Visual Cues aspect is one that promotes the use of visual indicators to help employees respond to needs on a more intuitive and practical level, in the form of visual tools such as Kanban cards and graphical user interface screens. Kanban, another Japanese term, means "visual card" and refers to the use of visual card signals to regulate the pull of products through the manufacturing process that is triggered by an upstream customer demand request. This is a methodology that shifts the traditional philosophy of pushed based methodologies such as those promoted by the use of Material Requirement Planning systems to pull oriented production methodologies.

Documenting procedures and work instructions sounds like another common sense activity but is often overlooked. By documenting procedures and instructions, it becomes easier to assess where problems occur and how to communicate procedural changes to those involved in that particular value stream.

Error Proofing and Six Sigma are key components of the lean philosophy and the business improvement process, both ensuring that defects are eliminated at each step of the manufacturing process, including the receipt and inspection of purchased materials and components. Six Sigma takes quality management and error proofing to a quantitative level by establishing a means to measure defects for every million parts or transactions. Within Six Sigma, defects are considered anything outside the range of the customer's requirements and specifications.

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The Business Strategy Layer, which encompasses the specific applied methodologies, both business practice and software tools, is used to manage and monitor the business transitions, such as: customer order placement, customer order production, customer order fulfillment, customer service order tracking, and material receipt and inspection, etc. There are a number of strategies and tools that can be applied, some dependent upon the defined production methodology and flow, which can be based on a model of engineer to order, make to order, assemble to order, make to stock, batch produced, continuous flow, or a combination of several modes. Strategies selected are also dependent upon the management philosophy and the willingness to fully embrace specific business practice strategies. In addition, each strategy involves different levels of detail for reporting and tracking. Options include:

- Theory of Constraints (TOC)
- Drum Buffer Rope (DBR)
- Flow Manufacturing
- Just in Time (JIT)
- Simplified Market Pull (SMP)
- Lean Accounting

Regardless of the strategy chosen, it is critical to select a production strategy that can be executed by the entire organization and driven from the CEO level of the company. Some of the more recently developed strategies such as Simplified Market Pull have become attractive for their simplicity and ease with which they can be adopted by an organization.

It is widely known that a manufacturing-focused lean initiative requires CEO support to get the project off the ground and to sustain the effort. The same is true for extending the lean principles across all other departments. Companies who have used traditional push based methodologies, using tools such as material requirements planning applications need to completely change the thought process and daily routine of how they perform their jobs. In addition, the fact that a lean initiative requires business process change and cooperation from all supporting organizations, means that there must be company-wide buy-in, and the CEO is the only person with the authority to make that happen.

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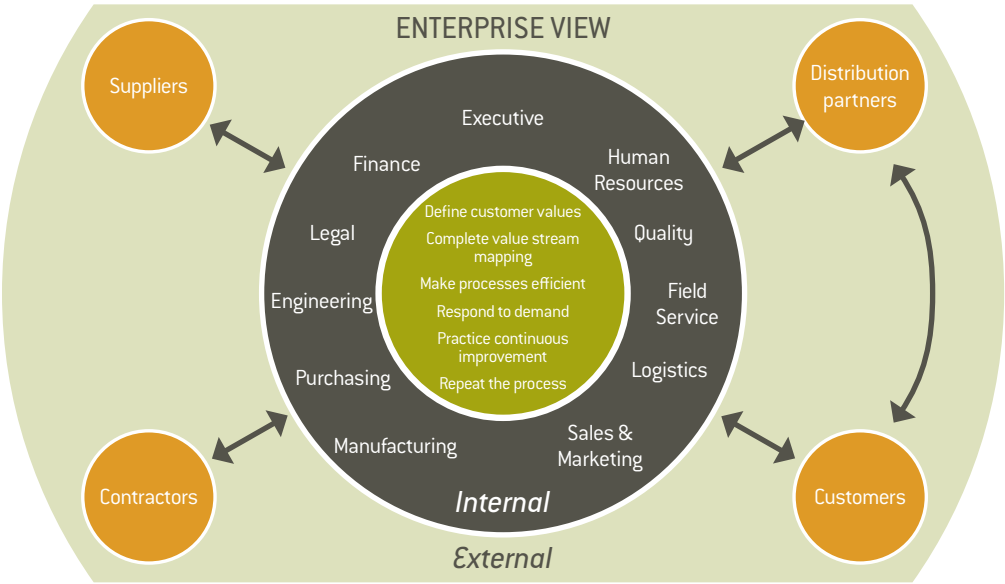

Figure 2. Applying a lean philosophy requires the inclusion and participation of all enterprise constituents, both internal and external.

Once the company as a whole begins to embrace the lean philosophy, each department can realize significant benefits. But each department or functional area must look at who their internal and external customers are, in addition to the traditional end customer. Marketing's customers, for example, are the organization's sales people, their sales channels, their distribution partners, and complementary solution partners. Product engineering and design's customers are product development, customer service, manufacturing, logistics, and sales. While Quality Assurance serves product development, engineering, manufacturing and distribution; Finance and Human Resources departments should view every functional department as their customer, providing business intelligence, business planning and reporting to improve their department level performance.

Drilling a little deeper within each department, each functional area can start by developing their value stream map of the typical business process flows to look for areas of improvement. This should ideally start with an effort to gather feedback from the different internal and external customers, which can be accomplished through interviews and surveys. Within the Customer Management side of the business, there are numerous value streams that need to be examined for improvement, linking customers with sales, service, marketing, engineering, distribution, manufacturing, quality assurance and finance departments. Typical examples include:

Order Processing - The order processing department needs to look at the different options and procedures for customers to place orders, and the impact on other organizations. Do they support the needs of the customer? How do customers prefer to place an order, and what are their typical requirements encountered during the process? How often do customers inquire about their order status and what is the most efficient and customer-centric way of making order status available? What are the payment options and terms that meets the needs of the customer, the sale department, and finance with the company? How are orders accepted, processed by manufacturing and fulfilled?

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Warranty and Repair - Warranty, Repair, and customer service needs to balance cost, responsiveness and customer satisfaction. How are customers served in this area? Are the procedures and terms clearly documented with the product? Are the procedures convenient, efficient and cost effective for the customer? Are records maintained and communicated to design engineering and manufacturing for product improvement? What is the process to acquire spare parts and how are services and repair work delivered to the customer?

Customer Service - Customer Service must be able to serve customers efficiently, while adding value and solving their issues. Long term customer loyalty is dependent on successfully managing this relationship. What are the options and what is the procedure for customers seeking to resolve an issue? What is the expected wait time and when do customers typically call so that resource allocation is appropriate and cost effective? What are the anticipated issues along with known corrective action? How is follow-up approached and how are common issues communicated to other organizations and documented for future reference when the same customer calls again?

The same applies on the supply side of the organization, where the value stream of procure to pay is examined. In addition to the needs of the end customer on the demand side, organizations should review the ability to apply the lean philosophy with their suppliers and internal supply-side customers, such as: design engineering, manufacturing, receiving and inspection, quality assurance, and finance. Examples include:

Quality Assurance - The process of Quality Management extends from one end of the Supply Chain to the other, requiring communication with research and development, engineering design, product management, manufacturing, inventory control, receiving and inspection, customer service and repair, and supplier organizations. Quality issues that don't get resolved quickly can not only lead to increased costs, but also can also lead to increased waste and inefficiencies. How are quality issues documented and communicated to suppliers, production, engineering and design, customer service and sales? How are nonconformance related issues tracked and evaluated with trend analysis tools? How quickly and efficiently are nonconformance issues communicated to manufacturing production and the suppliers? How are customer service issues communicated to the quality assurance group?

Supplier Relationship Management - Purchasing must be able to source products efficiently and cost effectively from the best performing supplier organizations. To accomplish this, an organization must be able to optimize the flow and access of requirements between the potential suppliers. How are requirements communicated to the suppliers? How often are requirements updated and are there procedures in place to ensure suppliers have easy access and notification of requirement changes? How are quality issues communicated and how often are they communicated to the Supplier Relationship Management (SRM) staff? How are received and inspected goods, which are found to be non-conformant, tracked and reported to the SRM staff for supplier performance rating?

Supply Chain Management through the eyes of lean involves the elimination of product defects from suppliers, reducing procurement transactional costs, reducing the lead times to support demand driven and pull based strategies, and on-time delivery accuracy to ensure there is not a negative impact on the demand side of delivery performance. To attain these goals, it requires continuously improved communication of procedures, requirements, and delivery schedules that can be updated and reviewed by the suppliers through electronic means in real time.

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Lean Quality Management and Six Sigma®[2] was developed originally by Bill Smith at Motorola in the 1980's as a way of measuring product defects and ultimately improving quality through a methodology designed to reduce defect levels below 3.4 defects per one million opportunities (DPMO). Lean Quality can be implemented in one of several similar models, including: DMAIC (Defines, Measure, Analyze, Improve, and Control) and is used typically to improve an existing process: Define the process improvement goals that are consistent with customer demands and the business strategy; Measure the current process and collect relevant data for future comparison; Analyze the data to verify relationship and causality of factors. Determine what the relationship is, and attempt to ensure that all factors have been considered; Improve or optimize the process based upon the analysis using techniques like Design of Experiments; Control to ensure that any variances are corrected before they result in defects. Set up pilot runs to establish process capability, transition to production and thereafter continuously measure the process and institute control mechanisms.

DMADV (Define, Measure, Analyze, Design, and Verify) used when designing a new product or process: Define the goals of the design activity that are consistent with customer demands and enterprise strategy. Measure and identify CTQs (critical to qualities), product capabilities, production process capability, and risk assessments. Analyze to develop and design alternatives, create high-level design and evaluate design capability to select the best design. Design details, optimize the design, and plan for design verification. This phase may require simulations. Verify the design, set up pilot runs, implement production process and handover to process owners. In either case, because product components can be produced by both internal and external resources, it is critical to develop value stream processes that extend beyond the four walls of the internal organization. In some cases companies have built their marketing value proposition around the completeness of their Lean Quality processes. For example, one company was noted to have been able to charge a premium for the thermal electronics controls since they guaranteed the inspection of every spool of wire used in their controls which yielded a dramatically reduced defect rate within their customers assembled products. As a customer to the product development and manufacturing department, the purchasing and receiving department adapted their value stream process to support this new requirement. By maintaining a better level of control over the entire internal and external manufacturing processes, the OEM company utilizing the thermal controls was able to put more resources on building customer orders and spending less money on managing nonconformance and defect issues.

Possibly one of the most difficult areas to adapt to the lean philosophy is the finance department; however this function is essential to understanding the bottom line benefits that are being realized. One way to ease the transition from traditional accounting to lean accounting is to supplement the company's standard financial statements with additional information that captures the resulting improvements.

Lean accounting dictates organizing costs by each value stream, and changing inventory valuation techniques along with modifying financial statements to include non-financial information, such as: lead times, scrap rates and on-time delivery performance. Inventory valuation, costs and inventory turns will undergo significant change using a lean strategy and lean accounting methods. This is a result of the focus shifting to manufacturing only to customer orders. Inventory costs should decrease significantly under a company wide lean initiative. Central to this shift is adopting a costing model that suits the lean philosophy, moving from standard and average costs

[2] Six Sigma is a registered service mark and trademark of Motorola, Inc.

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to actual costs (costs based on the resources actually used). A lean accounting approach also places greater importance on long term goals rather than short term ones, and focuses the organization on improving inventory turns, on-time delivery, customer satisfaction, and the reduction of defects and returns.

The benefits of bringing all facets of the business under the lean umbrella can be significant, and in many cases can mean the difference between staying in business and ultimately thriving or going out of business. Unfortunately many companies wait until it is a last resort instead of working proactively to make the shift to the lean philosophy. When approached as a company-wide initiative spanning all internal and external constituents, the resulting customer side benefits include:

- Improved on-time delivery performance
- Reduced lead times for faster order turnaround time
- Improved quality and reduced defects for fewer returns
- Potentially lower pricing due to lower operational costs
- Increased capacity to allow for increased customer order volumes

All of these benefits contribute to greater customer satisfaction, long term customer loyalty and repeat business. On the operational side, the organizational benefits include:

- Increased profitability
- Increased capacity to take on new business
- Increased capital to invest in new business initiatives
- Improved employee morale and retention, leading to improved employee performance
- The elimination of waste at all levels, which can reduce overall operating costs
- Lower inventory levels for reduced costs
- Improved employee satisfaction through greater empowerment, leading to improved retention
- Improved supplier relationships which can lead to lower purchasing costs

Adopting a holistic lean philosophy across the entire enterprise is a path rather than a destination. It requires continual monitoring and incremental improvement within each functional department and throughout all external relationships. Ultimately, an organization's ability to successfully adopt and extend lean across their entire supply chain requires not only organizational discipline and top level commitment, but also the right technology and the right professional services expertise. Infor has helped thousands of manufacturers successfully make the transition to lean, by applying a combination of best-in-class business application solutions, leading edge technology, lean business practice expertise, and industry experienced professionals. As an experienced lean solution provider, Infor understands the value that a supply chain wide lean initiative can bring to an organization, but also understands the challenges of making that transition a reality. By building greater trust and improved communication between internal and external participants, the organization as a whole can take the first step to improving quality, increasing efficiency, decreasing operational costs, and boosting profitability. As a result there will be an opportunity for increased customer satisfaction, improved employee morale and retention, and a newly found ability for increased capacity to grow the business. Given the accelerated pace of business change and global competition today, the lean philosophy is a business practice every organization should be considering in their business planning process.

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