LEAN FUNDAMENTALS FOR ACCOUNTANTS

By focusing on continuous improvement and the elimination of waste, lean allows organizations to successfully add value to the customer.

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Lean is a methodology based on the voice of the customer (VOC). Everything we do should bring value to the customer and solve his or her problem. For every task we attempt to complete, we need to ask ourselves if it generates value for the customer. If it does add value, then we need to determine how we can improve the task so as to add even more value. If the task is not adding value, we need to eliminate this activity. The idea is to get as close to the customer as possible, to understand and satisfy customer needs. Thus, lean is built on the fundamentals of capitalism and economics — supply and demand.

Lean is also based on monitoring and controlling — the very nature of the accountant. Reporting metrics to management is a major component of the accountant's responsibility. Lean utilizes organizational driving metrics to improve both the revenue (top line) and cost (bottom line). The key is to accurately detect the improvements and manage them properly. This article will give you the tools to accomplish this quickly and add value to the organization.

Finally, lean is based on the concept of team and synergy. There are two guiding principles that structure lean so that everyone, at any level of the organization, can participate at any point in the organization's maturity. The first is respect for people. As employees participate in lean, the organization will benefit from their added involvement, highlighting the idea of strength in numbers. This cannot be accomplished if the general workforce of the organization is not positively reinforced to strive to do better and accomplish more. The second principle is continuous improvement. This allows an organization to improve its foundation, continue the cycle through further improvements, and thus become closer to the customer. By aligning with the customer, the organization will separate from its competitors and gain a competitive advantage.

In summary, lean is about involving everyone in the organization in continuous improvement, which includes think-

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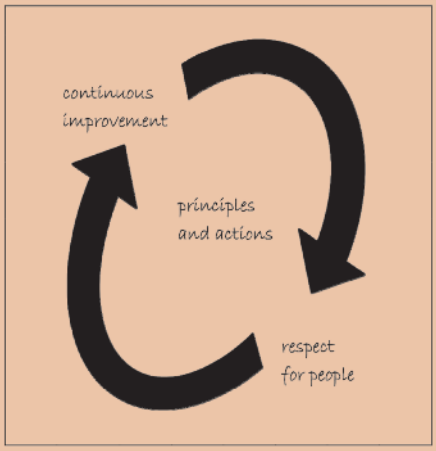
EXHIBIT 1 Lean Definition



ing every day about how to make the process better, cheaper, easier, faster, and safer.

Lean definition

Lean is the identification, elimination, and reduction of waste or non-value–added activity within a process as perceived by the customer. Lean has two concepts that make it completely different from other process improvement methodologies: respect for people and elimination of waste while understanding that nothing is perfect (see Exhibit 1). Lean develops and utilizes the entire organization to eliminate waste and continuously improve in order to focus on the customer. The idea is to have everyone — not just the front office — help add value to the customer.

Lean requires a process flow that is in control, effective, and efficient, which indicates waste is eliminated. The intention of lean is not to starve a process into control but rather to enhance it. Reducing cost is just one available lever; others include balancing demand, continuously improving, error proofing, and increasing throughput (as will be discussed).

Lean is typically cost neutral when it comes to improvement initiatives. The saying in lean goes, "You don't spend your way toward continuous improvement." Instead, lean uses current resources to improve processes.

When reviewing any process, the lean focus always starts with the customer. We try to identify VOC in everything we do in order to understand the customer's problems.

Lean thinking

This leads us to encouraging team members within the organization to think lean. In Jim Womack's book *Lean Thinking*, he describes this thought process as "a way to do more and more with less and less" to provide customers with what they want or are willing to buy.[1] This includes human effort, equipment, time, space, energy, etc. Anyone can use lean anywhere, from accounting to operations. Part of the change toward lean thinking is learning to see problems differently, as through the eyes of the customer.

History of lean

There are many ways to view the beginning of modern lean practices, such as Frederick Taylor's time and motion studies in the 1880s, which earned him the moniker "father of scientific management." Another possible beginning is Eli Whitney's development of interchangeable parts in the early 1800s, which spurred the Industrial Revolution. However, it was Henry Ford's mass production of automobiles that started the lean concept known worldwide; this connection was made by Toyota executives Taiichi Ohno and Shigeo Shingo in the crafting of the Toyota Way. The goals for improvement are expressed as working better, cheaper, easier, faster, and safer. This process was later studied, and the name "lean" was coined by Jim Womack in 1991 in his book *The Machine That Changed the World*. Currently, lean is being used in nonmanufacturing settings, such as health care and services (transactional).

Why lean

There are many benefits to implementing lean within your organization. In a 2013 study performed by Kaunas University of Technology, the top improvements included the following: return on assets; on-time delivery; machine availability;

EXHIBIT 2 Toyota Production System (TPS) 14 Principles of Lean — 4P Model: The Industry Lean Standard

1P: Philosophy: Long-Term Philosophy (1)		
	1. Long-Term Focus	*Hoshin kanri* - long-term meet short-term goals
2P: Process: The Right Process Will Produce the Right Results (2–8)		
	2. Create Flow	Bring issues to the surface
	3. Pull	Produce only what is needed to avoid overproduction
	4. Leveling	*Heijunka* - balance out demand
	5. Do It Right	*Jidoka* - quality right the first time - stop, fix, do it right
	6. Standardize	Build improvement philosophy to ensure continuous improvement
	7. Visual Control	Do not hide anything
	8. Technology	Rely on proven technology to serve the people and process
3P: People and Partners: Add Value to the Organization by Developing Your People and Partners (9–11)		
	9. Leadership	Grow your own leaders and embrace the TPS
	10. Teams	Develop people and teams who follow the TPS
	11. Help Others	Extend lean to partners and suppliers, respect
4P: Problem Solving: Continuously Solving Root Problems Drives Organizational Learning (12–14)		
	12. See for Yourself	*Gemba* walk - go and see for yourself to understand the situation
	13. Decision-Making	*Nemawashi* - make decisions slow, implement fast
	14. Reflection	*Hansei* - reflect and *kaizen* – continuously improve

*Adapted from Liker, J.K., *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.* (McGraw-Hill, 2004).

machine setup time reduction; utilization of labor; reduction in floor space; and inventory reduction.

Some of the reasons why lean didn't work included backsliding to old ways of work, a lack of implementation know-how, and employee and middle management resistance. Other studies indicated the following improvements:

- 50 percent reduction in inventory;
- 50 percent increase in capacity;
- 70 percent decrease in throughput time;
- 10 percent improvement in direct time utilization; and
- 50 percent improvement in indirect time utilization.

Thus, the benefits of lean include direct and indirect labor, less money invested in inventory, equipment, and facilities, and an added ability to react quickly to changes in demand.

As change agents, accountants can help lean succeed in an organization by supporting team members and top management. We can create an environment in which we lead by example, fix problems without avoiding the issue, encourage ideas, invest in training, and support continuous improvement.

Toyota Production System

The Toyota Way expresses the basic definition of lean: respect for people and continuous improvement (see Exhibit 1).

This leads into Jeffrey Liker's 4P model of the 14 principles of lean in the Toyota Production System (TPS) (see Exhibit 2). By considering TPS and VOC when solving customer problems, we will continuously improve in providing the best value to our customers.

EXHIBIT 3 Eight Wastes: The Real-Life Obstacles Preventing an Organization from Profitability

1. Transportation	Unnecessary movement of material or product
2. Inventory	Material or product that is used to cover for inefficiencies
3. Motion	Unnecessary movement of people; multiple hand-offs
4. Waiting	Elapsed time between processes when no work is being performed
5. Overproduction	Making or manufacturing in excess of customer requirements, service not needed
6. Over-Processing	Adding unnecessary steps to a process; redundancies between process
7. Defect	Anything that does not meet the accepted customer requirements
8. Skills/Resources	Demotivating the workforce by not asking for input or recognizing success

Lean can be summarized by the components of the 4P model: long-term philosophy, the right process that produces the right results, the development of people and partners to add value, and organizational learning driven by solving root problems. By understanding lean in this way, we can accept the underlying principles of the 4P model. Implementing lean requires a long-term approach that matches the short-term goals (*hoshin kanri*). Because we are utilizing a pull system to avoid unnecessary inventory, we only produce what the customer demands. To optimize the production schedule, we create a balance schedule to level the flow (*heijunka*) and expose bottlenecks. Since value-added time represents the true price the customer is willing to pay, we do not want to produce defects; rather, we want quality right the first time (*jidoka*), and standardization will promote continuous improvement. The organization will utilize visual control to identify wastes in the process and proven technology to assist in making the product. It will also grow its own leaders, develop teams, and extend the lean process to suppliers and customers to reduce waste. Through personal observation of the process, a *gemba* walk will expose any nontransparent issues in eliminating waste. As we implement change, we verify that the team takes the appropriate time to understand the issues and then implement them quickly (*nemawashi*). We also reflect to understand our process and continuously improve (*kaizen*). Thus, production is aligned with the customer to eliminate waste.

There are several key concepts to understand when teaching team members the 14 lean principles. Long-term goals must meet short-term goals for proper alignment of strategy. "Quality is free" relates to "it doesn't take extra effort or processes to perform the standard procedures." The Toyota Way can be applied to every process and industry. We can utilize customer and employee input to improve both products and services. It is why the *process* failed, not why the *team member* failed. As we understand more about lean, its implementation in an organization is a journey toward the organization's vision, not a single metric.

Seven wastes plus one

In lean, respecting people and continuously improving involves the elimination of *muda*, or waste. To identify waste, we need to categorize what we determine to be waste by using the acronym TIM WOODS as a way to remember each element (see Exhibit 3). Transportation includes the movement of people, machines, products, or information that do not add value to the product or service. An example in an office would be the mailing of files or reports to different locations. Inventory is anything not directly related to the customer's current orders, which occupy resources. One example is having printed customer reports stored when the customer has already received the reports. Motion relates to any extra steps taken by

team members that are inefficient. Examples include printers in suboptimal locations, excessive bending/reaching for required supplies, and movement of electronic files. Waiting is the period of inactivity during a task or project. For example, the time the accounting department needs to complete the month-end close prevents other users from accessing the network and completing their everyday tasks. Overprocessing is the added work performed that does not have value from the customer's viewpoint, such as added formulas or cosmetic details not requested by the customer on data-driven spreadsheets. Overproduction includes providing the customer with more products or services than is required; this would include multiple spreadsheets answering the customer's question. Defect is anything that does not meet customer expectations, such as formulas that do not add properly on a spreadsheet. Plus one is skills underutilized by team members to meet customer demand; it is the waste of human potential, knowledge, and talent. One example is allowing security personnel to perform internal audit functions without training.

Five steps in lean

In lean, there are five steps required to maximize the customer value and minimize waste. They are used every time we utilize lean tools (see Exhibit 4). Step one is to identify value. When we review a process, we must understand what the customer deems as value and is willing to purchase. Anything not identified as value in the process is considered non-value and waste to be removed. Step two is to identify the value stream so as to understand the entire process, documented and not documented. Step three is to understand the flow of the process. The goal is to reduce the flow time. Step four is to establish a pull system, which will allow our team members to work on the customer's demand only when needed. Step five is to seek perfection with continuous improvement. By removing waste, we can improve the business performance. In lean, many small improvements are better than a system-wide analysis.

EXHIBIT 4 Five Steps of Lean: Understand the Overall View of Implementing Lean in an Organization

1. Identify value
2. Identify value stream
3. Flow
4. Pull
5. Perfection

Lean is a process that is in control, and being in control means it is effective and efficient. This leads to a process with little variance and little waste. The question all lean professionals will ask when observing a process is: Are we effective, efficient, and in control? We train our eyes to identify waste; we call this "learning to see" or "lean eyes."

Lean manufacturing roadmap

The basis of lean comes from Dr. W. Edwards Deming. His simple management style of plan-do-check-act (PDCA) was implemented in the beginnings of lean with the Toyota Way. After management commits to lean, the question from the customer is: Can the organization meet the customer's demand? If yes, we structure the organization using PDCA in order to meet the demand. If no, we review why the organization cannot meet the customer's demand.

House of lean: Lean tools and techniques

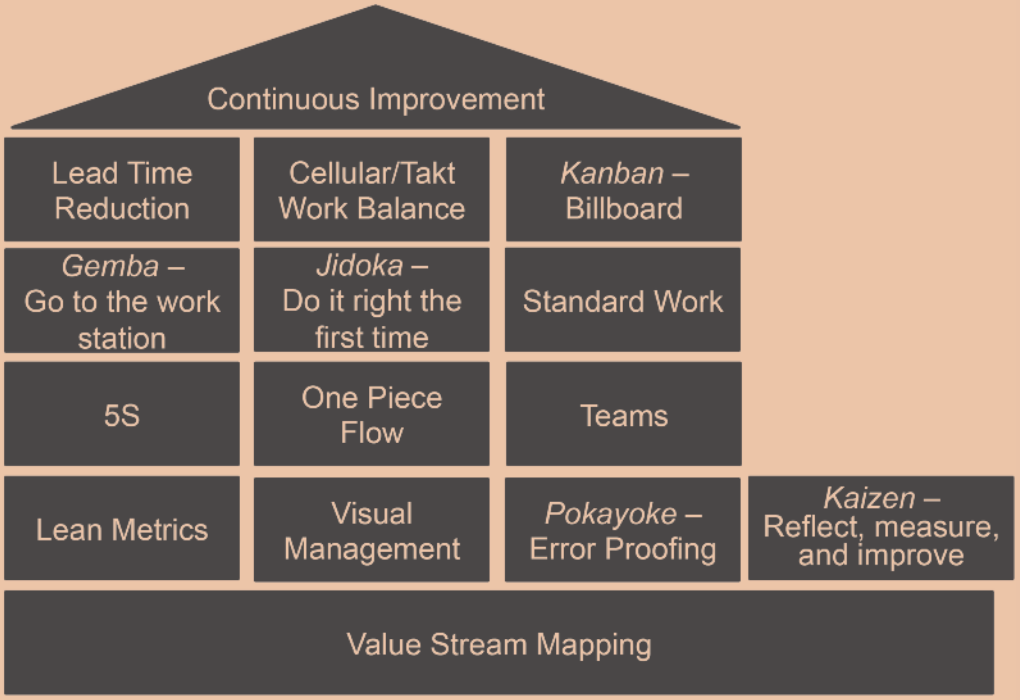
Utilizing the lean tools is as important as understanding customer demand or VOC. The house of lean is used to help us keep our skills up to date and eliminate waste (see Exhibit 5). We will review some of the most important lean tools, the basics of how to utilize them in an office setting, and how to implement them quickly.

Lean office for accountants: Examples

The following are some tools to use in a lean office:

- 5S;
- *gemba* walks;
- *kaizen* blitz;

EXHIBIT 5 House of Lean



- lead time reduction (LTR);
- one piece flow;
- run/control charts;
- value stream maps; and
- visual management.

5S is the organization of the workplace that finds an orderly flow of the office to eliminate waste. There are two phases for this process: The first is to eliminate all the items not needed on a daily task process, and the second is to create a system in which everything that is needed to complete routine tasks has a unique location. Although some will advocate for the elimination of all non-work–related items on desks or workshops, my retort is that lean involves respect for people. If the family picture is not interfering with the completion of the task, I do not see a reason to remove the item. The actual 5S steps are the following: sort (*seiri*); set in order (*seiton*); shine (*seiso*); standardize (*seiketsu*); and sustain (*shitsuke*).

In practical terms, when applying 5S to the office, sorting involves moving everything to where it is needed. When in doubt of the item's usefulness, remove it from the location. Setting in order places the item where it can be found or visually seen. Shining cleans and verifies that the item is relevant enough to retain. Standardization establishes and enforces the rules for the use of the item. Sustaining incorporates the item in daily or routine usage and calls for reviewing the 5S steps for continuous improvement. A good example would be Microsoft Excel files used monthly for inventory reconciliation. First sort all files in question by name. We can then set them in order on the network drive by year and by month. We can shine the files to have specific tabs or highlighted cells that contain the answers needed by internal customers. Standardize the creation of the new monthly files to keep the filing structure in place. Sustain the practice by verifying with the internal customers what they need and when they need it in order to continuously improve the process and eliminate non-value–added tasks or waste.

Gemba is a visual walkthrough of a workplace, the actual observation of what is happening when completing a

task. This is not management by walking around (unstructured). A *gemba* walk is a structured, team-positive, data-gathering, routine event intended to improve the process. The *gemba* process requires reviewing an area regularly with another employee, gathering information, and reflecting on what was observed. This allows for the team to understand the current state of the process and validate any assumptions. An example for the office includes reviewing how other remote offices close month-end and report financial information for consolidation. The team can look at groups that perform well and poorly to see where improvements can be initiated. Another example is to review an area that has experienced large financial metric variances (favorable or unfavorable). Understanding how and why the area is currently working can produce valuable information for continuous improvement and future budget planning.

Kaizen blitz, or change for the better, involves a quick and structured implementation of an initiative to rapidly improve a process and eliminate waste. This is one of the early building blocks of establishing lean in an organization. This is typically completed in five steps: orientation, understanding the current situation, developing improved processes, making improvements, and reporting and celebrating results. In the office, we can start such events for improvement with cash reconciliation, month-end close, order-to-payment processes in purchasing, payroll reporting, budget information for planning, and timely payments for receivables.

LTR is the process of identifying and eliminating non-value–added activities or waste from the process being reviewed. Lead time is the total time required for processing a product or service from when the customer places the order to delivery to the satisfied customer. Value-added activities are those for which the customer is willing to pay, while non-value–added activities are those for which the customer is *not* willing to pay. By identifying value according to the customer, we can determine which activity causes the most waste and how to eliminate it from the process. In the office, LTR can be used for reviewing cycle processes, such as the customer payment cycle and vendor approval cycle, which incorporate different people and organizations.

LEAN FUNDAMENTALS

Below are five key facts of lean to keep in mind:

1. **Lean = Respecting people.**
2. **Lean = Continuous improvement.**
3. **Lean = Customer focus.**
4. **Lean = Eliminate waste.**
5. **Lean = Flow, in control, effective, efficient.**

The following are five lean sayings to consider:

1. **Is our process in control? Is it effective? Efficient?**
2. **Use "lean eyes" to identify waste.**
3. **Provide a way to do more with less.**
4. **Continuously improve the process to be better, cheaper, easier, faster, and safer.**
5. **Get closer and closer to providing customers with exactly what they want.**

One piece flow is a basic fundamental principle of lean. As a pull system, this process enables each operation to complete one item at a time instead of a group of multiple items. The process can complete the item faster and without adding waste. In an office setting, we can incorporate one piece flow for activities such as mail distribution, customer inquiries, and flexible job tasks.

Run/control charts are used to detect trends and significant changes in the observed process. In accounting, this can be performed for transactions such as the number of days to pay an invoice or respond to a mandatory compliance request. By tracking each instance, the accountant can determine the average response time percentage above or below the average, number of consecutive runs above or below the average, normal distribution of data, and special cause indicating that the process has changed as well as when it changed.

A value stream map is a visual documentation of all the activities and information involved in the production of a product or service for the customer. The value stream crosses all functional depart-

EXHIBIT 6 Lean Metrics

Classical / Traditional Yield:	Total shipped / total attempted to produce
First-Time Yield:	Completed parts without rework / parts worked in the operation
Rolled Throughput Yield:	First-time yield * first-time yield * first-time yield, etc.
Takt Time:	Work time available / customer demand
Cost of Poor Quality (COPQ):	Total value of waste determined in a process, organization

ments, lines of responsibility, material/operations, and information flow. We use the map to visualize the true operation beyond a single-process level and identify the current and future state with real metrics of cost and time. It becomes the blueprint for improvement and elimination of waste. In many lean organizations, the value stream map for each product or service becomes the standard for costing and planning (i.e., a metric to compare against the actual cost). This is a must for all lean organizations to identify improvements as well as for the accountant to report real results to management.

Visual management is the observation of all lean concepts for the organization to eliminate waste. In other words, the workspace should be effective, efficient, and in control. Room for improvement becomes immediately apparent at any work station due to visual management's accurate, concise, and easy-to-understand approach. In an office setting, this includes storing paper or electronic files efficiently; a key question to ask is how long it takes, or how many clicks are required, to find a file. This is sometimes called management from 30,000 feet.

Metrics to drive performance

Reporting on the performance of the organization is an important task for accountants that is expected by all customers. Because accountants are situated in the monitor and control function of the organization, they have the ability to understand the drivers of the organization and how the metrics connect throughout the organization, representing synergies. The lean metrics are no different in that they look to identify waste and improve the flow of the process, resulting in the organization's ability to produce more products and services with the same infrastructure or less. Lean provides the organization with the ability to improve the top line (revenue) and bottom line (cost) at the same time. The main issue for accountants is the nondetection of the improvement. Because lean metrics are not commonly utilized by organizations, the benefits of lean may be missed or overlooked, thus leading to the statement by management guru Peter Drucker: "If you can't measure it, you can't manage it."

The lean metrics that drive all businesses include the following:

- classical/traditional yield;
- first-time yield;
- rolled throughput yield;
- takt time; and
- cost of poor quality (COPQ).

Traditional yield measures quality at the end of the process (total shipped or total attempted to produce). First-time yield measures good parts that did not get reworked at any process and are used to determine the quality level at each individual process. The formula is just as easy: the total number of completed parts without rework divided by the total number of parts worked in the operation. Rolled throughput yield is the probability of a part making it all the way through every step without ever being scrapped or reworked — the cumulative quality level of the process. The formula is the product of each individual operation's first-time yield. This is also called the "hidden factory" cost of the operation. Takt time is the time (pace) required to make a product based on customer demand. This is used to synchronize the pace of production with the pace of sales. The formula is the

EXHIBIT 7 Comparison of Improvement Programs

PROGRAM	LEAN THINKING	SIX SIGMA	THEORY OF CONSTRAINTS
Theory	Remove Waste	Reduce Variation	Manage Constraints
Application Guidelines	1. Identify value 2. Identify value stream 3. Flow 4. Pull 5. Perfection	1. Define 2. Measure 3. Analyze 4. Improve 5. Control	1. Identify constraint 2. Exploit constraint 3. Subordinate process 4. Evaluate constraint 5. Repeat cycle
Focus	Flow-Focused	Problem Focus	System Constraint
Assumptions	Waste removal will improve business performance Many small improvements are better than system analysis	A problem exists Figures and numbers are valued System output improves if variation in all processes is reduced	A problem exists Figures and numbers are valued System output improves if variation in all processes is reduced
Primary Effect	Reduced Flow Time	Uniform Process Output	Fast Throughput
Secondary Effect	1. Less variation 2. Uniform output 3. Less inventory 4. New accounting System 5. Flow - performance measure for managers 6. Improved quality	1. Less waste 2. Fast throughput 3. Less inventory 4. Fluctuation - performance measures for managers 5. Improve quality	1. Less inventory/waste 2. Throughput cost accounting 3. Throughput - performance measurement system 4. Improved quality
Criticisms	Statistical or system analysis not valued	System interaction not considered Process improved independently	Minimal worker input Data analysis not valued

work time available divided by customer demand. To summarize, these metrics are used to identify waste, understand the process flow, and identify the financial impact or COPQ. This will indicate to management the cost of inaction or not implementing continuous improvement initiatives (see Exhibit 6).

Comparison of improvement programs

The lean methodology aims to satisfy the customer through respect for people and continuous improvement by removing waste. Lean concentrates on the flow of the process. By removing waste, the performance will improve. Overall, the attempt for improvement is made through smaller improvements. Other methodologies have different focuses (see Exhibit 7). Six Sigma is focused on the elimination of variance through statistical problem-solving methodology. The theory of constraints concentrates on managing the constraints through increasing throughput. As you can see, there are many tools the accountant can use that assist with optimizing operational performance; lean is just one option.

When to implement lean tools

A quick guide to utilizing the lean tools at the beginning stage of a lean journey

can be helpful. Here are several tips to assist you with this process.

If the process produces too much compared to customer demand, implement a pull system (such as one piece flow) to link output directly to customer demand. If the process is not producing enough compared to customer demand, review capacity constraints and focus on removing non-value–added activities through LTR. If the process is meeting customer demand but has long process lead times and high overhead cost, try the following tips:

- Use 5S to improve the cleanliness and organization of the workspace.
- Implement a pull system (one piece flow) to stabilize and then reduce process steps in order to decrease lead time.
- Reduce batch sizes to the minimum safe batch size for the given process parameters.
- Use LTR to identify non-value–added time.
- Conduct total productive maintenance to reduce downtime.
- Check the process for errors.
- Balance the process and make sure the workload is not uneven.
- Have a safety stock in the event of demand variation.

If the process steps have uneven workloads that lead to labor inefficiencies, make sure the process is balanced. If the process involves too much movement of information or material (making the process flow inefficient), use value stream mapping to improve process flow and optimize work cells. If the process flow is efficient but has too much non-value–added time, employ LTR to identify non-value–added time.

Lean conclusion

As a fundamental review of lean, this article skims the surface of the full implementation of the lean methodology. (See the sidebar for basic lean fundamentals.) For the accountant, there are many ways to implement lean. This article provides several quick implementation initiatives. As with any new concept, the more you try, the better you become; the more you do, the better you are. I wish you the best success in your lean journey. ■

NOTES

[1] Womack, J.P. and Jones, D.T., *Lean Thinking: Banish Waste and Create Wealth in Your Corporation.* (New York: Simon & Schuster, 2003).