

Lean Accounting and Finance

Cash flow tells the tale.

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A whole industry has developed around helping companies become "Lean." Books and articles have been written, seminars have been presented, and consulting firms have started Lean practices. In spite of this, most companies that attempt to transform themselves to Lean either fail or attain only a portion of the benefits possible. Why is this?

Certainly the principles of Lean are easy to agree with. No one argues that the benefits are not worth pursuing. But as easy as it is to agree with, the reality is that Lean is hard to do. Most people look at Lean as some "manufacturing thing" and only implement elements of it such as cells and Kanban. Very few companies understand that Lean is a business strategy, not a manufacturing tactic, and are unable, or unwilling, to address changing the other aspects of the business.

Like any strategy, in order to successfully implement Lean, everything the company does has to support it, and whatever doesn't has to be changed. Thus, product development processes, sales terms and marketing programs, human resource policies and procedures, and accounting systems have to be examined in order to insure that they do not contain elements that contradict the Lean strategy. In most

companies the accounting systems, and the accountants, tend to be the most significant barrier to successfully implementing Lean.

Incompatible Accounting

In 1987 H. Thomas Johnson and Robert Kaplan in their book *Relevance Lost: The Rise and Fall of Management Accounting* clearly stated that traditional management accounting was inadequate for today's environment. If that was true then, it is certainly truer now as companies attempt to account for the Lean enterprise with tools that were developed in the early part of the 20th century.

In its simplest form accounting and the information it produces, such as financial statements, are nothing more than a mirror, which when held up to the operations of the company gives the reflection of those operations valued in dollars. Today we still use accounting systems based on principles such as absorption, standard costs, and variance analysis which were developed to deal with operations that were based on large batches, long leadtimes and lots of inventory at every stage of production. When these systems are used to account for operations based on flow, short leadtimes, and very little inventory, the results

that are being reported are distorted, just as a trick mirror at the carnival fun house distorts our image when we stand in front of it. Even worse, it's not mere distortion, but for companies successful in reducing inventory these systems report the results as negative! In effect, management is being lied to by the traditional accounting systems. More about this problem later. First, let's look at accounting in support of the Lean enterprise in its broadest sense.

The Four Dimensions of Lean Accounting

There are four dimensions of transforming accounting to support the Lean environment:

- 1) Transactions appropriate for the manufacturing practices employed
- 2) Performance metrics that measure the right thing and motivate the right behavior
- 3) Accounting processes, cost management techniques, and financial reporting that adhere to Lean principles
- 4) Recognition that investment management decision making is different.

Appropriate Transactions

The first dimension is relatively straightforward. It recognizes the fact that planning and control of flow/pull scheduling processes is simpler than that for batch/push scheduling processes. Flow/pull processes are set up to produce to actual customer demand whereas batch/push processes are set up to produce to a forecast. From an operational standpoint many of the mechanics of MRP systems are replaced with systems, such as Kanban, that are much more visual. Many of the transactions that support MRP, such as labor tickets and move tickets, can be eliminated. A simple principle to keep in mind is that transactions that exist in the factory should serve an operational purpose. They should not exist just for accounting.

The Right Performance Measures

In the second dimension, most of the performance measures that exist in traditional batch and queue operations should not be used in a Lean operation. Measures such as direct to indirect labor ratios, labor efficiency, machine utilization, and earned labor dollars can lead one to make poor decisions in the Lean environment. For example, one of the fundamental principles in Lean is to manufacture product to takt time, which is the rate at which customers buy products measured in time. For example, if we operate one shift with 450 minutes available each day and customers buy 900 units per day on average, the takt time is 30 seconds. If we can produce one unit every 30 seconds we will satisfy the customers' demand. If we can't, we have unhappy customers.

On the other hand, machine utilization is geared to "reducing" the piece part cost by producing as much as possible. The behavior this generates is to overproduce, resulting in excess inventory.

Another fundamental principle of Lean is the total elimination of waste. This principle recognizes the fact that:

PRODUCTIVITY = WEALTH

If our focus is to eliminate waste, such as increase productivity, then many of our metrics should measure this. A working definition of productivity is the relationship between the quantity of output and the quantity of resources (input) consumed in creating that output. If we get more output with the same level of input we have a productivity gain. Therefore, measuring productivity gains focuses on quantities, not dollars.

In our education and experience we are trained to focus on measuring things in dollars, but productivity cannot improve through financial engineering. Only physical change can influence the relationship between quantities of output and quantities of input. Therefore, these metrics should be quantity-based and maintained where work is done.

In most companies the accounting systems, and the accountants, tend to be the most significant barrier to successfully implementing Lean.

Unlike the traditional metrics that are focused on results, most metrics in the Lean environment should focus on the process. If we focus on the process and remove non-valued activities such as unnecessary movement, excess wait time, rework, and the other "Seven Sins of Waste," the results — improved productivity — will come.

Once we recognize that many of the traditional performance measures are inappropriate for the Lean enterprise, the question arises, "what should we measure?" In this environment, some metrics are close to being universal — customer service, productivity, defect reduction, takt time, and cycle time. Others depend on the specific business. However, it is possible to identify some of the attributes of a good performance measurement system, as shown in Figure 1.

Walker Systems, Inc., a Wiremold company, is a good example of measuring the process and not the people. There, when we started measuring the reasons that we did not meet takt time, cell by cell, we discovered that two reasons represented more than 50 percent of the occurrences, material unavailability, and unplanned downtime. The third most recurring reason was people-related, but was due to inadequate training, not inadequate effort. Thus it too was really a management problem, not a people problem.

Lean Accounting

Accounting processes, cost management, and financial reporting are the heart of what the accounting function is involved in day-to-day. Whenever we get involved in discussions regarding the implementation of Lean in other companies we hear all kinds of excuses why it doesn't apply to them: They make different products, they are bigger and more complex, they are smaller and can't devote the resources to improvement. In some way they are different, so it won't work there.

However, the reality is that from business to business there are more similarities than differences. Whether in manufacturing or in service, each company has to take an order from a customer, deliver a product or service, send an invoice, and collect. Each has to purchase things, receive them, and pay for them. Each has to produce that product or render that service. Each wants to develop new products or services. Each has to hire and pay people. These generic business processes may differ in detail from one business to another, but they are similar in attempting to do the same basic functions. And each is similar in containing huge amounts of waste.

From an accounting perspective the work content of most of these processes has a high degree of clerical activities and a low degree of analytical content. And each is similar in that the same principles of process improvement that make the factory Lean can and should be applied to them. In doing so the work content can be changed

Attributes of a Good Lean Performance Measurement System

- Supports the Lean strategy
- Motivates the right behavior (such as, eliminate waste)
- Number of metrics not excessive, so as to maintain focus
- Mostly non-financial
- Simple and easy for people doing the work to understand; the connection between their actions and each measure is clear
- Measures the process, not the people
- Measures compare actual versus goals
- Avoids indices, as they are not actionable
- Must be timely: hourly, daily, weekly as appropriate
- Displays trend lines to mark continuous improvement
- Make them visual and post where everyone can see them.

Figure 1.

so that less time is spent on non-value added clerical content and more time is devoted to value added analytical content. This is just one of the ways the accounting function can contribute to the Lean transformation.

The traditional manufacturing environment devotes significant resources to "cost accounting," which emphasizes determining the cost of each product made and trying to control costs by adhering to budgets. In the Lean company, accountants must take a broader view ... one of cost management. As the company tries to deliver products and services that are more competitive in terms of functionality, cost, quality, and delivery, cost management focuses on providing information regarding the profitable use of resources in providing these things. This broader view of cost must include cost planning in addition to cost control and cost accounting.

Cost Planning: Target Costing

Several studies have estimated the amount of a product's life cycle cost that is committed during the product design process. Results vary, but range between 85-95 percent of the total life cycle costs. In other words, everything we do day-to-day, short of redesigning the product, affects only 5-15 percent of life cycle costs. And yet most product developers focus only on fit, form, and function and are blind to costs until near the end of the product development cycle when the accountants figure out the "cost," add a profit to determine the selling price, and marketing decides if they can sell it at that price. If they can't (that is, the market price is lower) the only alternative is to redesign the product (which itself is waste) or accept a lower profit.

However, incorporating target costing into the product development process can avoid this no-win cycle. Michiharu Sakuri has described target costing as "a cost-planning tool used for controlling design specifications and production techniques. Therefore it is oriented much more towards management and engineering rather than accounting."

Target costing recognizes the reality that the old cost-plus method of pricing died many decades ago. The market sets the price. Instead of $\text{Cost} + \text{Profit} = \text{Selling Price}$, the current reality is $\text{Selling Price} - \text{Cost} = \text{Profit}$. In target costing the marketing group must identify the selling price during the product conception stage and then apply the formula: $\text{Selling Price} - \text{Profit} = \text{Target Cost}$. The target profit is established by management and can only be changed by management.

The target cost becomes part of the product specification. At every tollgate of the development process that cost is estimated. If it is above the target cost by an amount that cannot be corrected in the future stages of the development process, the project cannot move forward. Thus, even at the product concept stage, the cost can be estimated, and if it is not acceptable, the concept can be changed before significant resources are committed to a concept that will not yield an acceptable profit. In addition to target costing, if the company applies the principle of designing the manufacturing process concurrent with designing the product, life cycle costs can be significantly reduced.

Cost Control: Lean Style

In addition to cost planning, the concept of cost management includes cost control and cost accounting. Cost control has become a euphemism for cost reduction, and in the Lean environment the principal method of cost reduction is by the kaizen process. This is a team-based approach of studying a problem and implementing improvements ... all within a three-to five-day period. It has a bias for action because it doesn't look for the perfect solution, but allows for partial solutions. As long as some improvement is made, that's all right. Another kaizen event will look at that same area again and additional improvements will be made in the future.

The other major tool to reduce costs in the Lean environment is a system of performance metrics, most of which are non-financial. The cost of waste is the mathe-

mathematical product of the frequency of defects times the severity of them. Non-financial measures are aimed at reducing the frequency of defects. If defects can be eliminated then severity becomes a non-issue.

Cost Accounting

In the traditional batch and queue environment the typical method of looking at cost is through standard cost accounting, absorption, and variance analysis. Figure 2 represents a "text book" standard cost P&L

for a company that had an increase in sales but no increase in gross profit. In this author's experience, most people do not understand a standard cost P&L so that this presentation of the information is virtually useless. It gives virtually no meaningful information as to why sales increased but profit didn't. Worse still, if this company's VP of operations had convinced the CEO that they should start implementing Lean and these were the reported results, he would most like get an order like, "I don't know what you are doing, but stop it, it's killing us." In addition to the inability of this presentation format to provide meaningful information, the mechanics of absorption accounting underlying it motivates the wrong behavior.

In standard cost, absorption accounting overhead rates are set based on an overhead spending budget and the number of labor or machine hours expected to be incurred. Then on a month-by-month bases overhead is "absorbed" based on the actual hours "earned." If the number of hours earned is less than the budgeted hours, an unfavorable overhead volume variance is created.

Although most first-line supervisors may not understand the ins and outs of standard cost accounting, they quickly learn that unfavorable variances are bad and that unfavorable volume variances can be avoided by creating enough hours. Thus at the end of the month they search around to see what parts can be made that will create the largest number of hours, regardless of what MRP or any other schedule calls for. The problem is that there is no connection between hours and what the customer wants. The result — avoiding the unfavorable variance creates excess inventory.

The other significant problem with standard cost accounting is that it attempts to calculate individual product costs by allocating overhead costs based on hours. At a time when overhead was a fraction of direct labor cost, this was appropriate. However, because of the changing profile of costs, overhead has become a multiple of direct labor cost. Overhead rates between 200 percent and 400 percent of labor are not

Standard Cost Comparison: Traditional Case

	<u>This Year</u>	<u>Last Year</u>
<u>Net Sales</u>	100,000	90,000
Cost of Sales:		
Standard Costs	48,000	45,000
Purchase Price Variance	(3,000)	10,000
Material Usage Variance	(2,000)	5,000
Labor Efficiency Variance	7,000	(8,000)
Labor Rate Variance	(2,000)	9,000
OH Volume Variance	2,000	2,000
OH Spending Variance	(2,000)	8,000
OH Efficiency Variance	<u>16,000</u>	<u>(17,000)</u>
Total Cost of Sales	<u>64,000</u>	<u>54,000</u>
Gross Profit	36,000	36,000
Gross Profit as a Percent of Sales	36%	40%

Figure 2.

Lean Manufacturing Cost Summary

unusual. As an accountant I know that the amount of overhead allocated to various departments, and therefore to products, is dependant on the allocation methods I choose.

Choosing one method over another can make an individual product's cost vary significantly. And yet most companies believe they "know" their product costs — out to four decimal places — a classic case of confusing precision with accuracy. How many companies make decisions to discontinue a product because the accounting system makes it appear to be unprofitable? Or how many companies run end of quarter specials of those products that the accounting system reports as very profitable? If I were to choose different allocation methods, would the decisions be different?

If the standard cost P&L is not a useful management tool, can we create something that is? At Wiremold, we addressed this issue in the early 1990s and decided to use the following principles to guide us:

- Must be usable by non-accountants
- Must eliminate complexity in presentation
- Must have a higher degree of assignable costs and a lower degree of allocated costs
- Must include both financial and non-financial data
- Must motivate the right decisions.

Figure 3 shows an alternate presentation for the same company displaying information about the prime costs incurred. From this presentation we can see that the manufacturing group has actually done a pretty good job. Labor costs are down, as are services, supplies and scrap. Benefit costs clearly showed up as a problem in Figure 2, so I know that I have to address this.

The "bottom line" as to why gross profit did not increase as sales did, is that in our Lean implementation we have successfully reduced inventories. This has a negative impact on profits in the periods that we do this. Inventory turns have improved, as

	<u>This Year</u>	<u>Last Year</u>	<u>+(-)%</u>
Net Sales	100,000	90,000	11.1
Cost of Sales:			
Purchases	25,300	34,900	(25.7)
Inventory (Inc)/Dec: Mat'l Content	<u>6000</u>	<u>(6000)</u>	
Total Materials	31,300	28,900	8.3
Processing Costs:			
Factory Wages	11,000	11,500	(4.3)
Factory Salaries	2,100	2,000	5.0
Factory Benefits	7,000	5,000	40.0
Services & Support	2,200	2,500	(12.0)
Equipment Depreciation	2,000	1,900	5.3
Scrap	<u>2,000</u>	<u>4,000</u>	<u>(50.0)</u>
Total Processing Costs	26,300	26,900	(2.2)
Occupancy Costs:			
Building Depreciation	200	200	0.0
Building Services	<u>2,200</u>	<u>2,000</u>	<u>10.0</u>
Total Occupancy Costs	<u>2,400</u>	<u>2,200</u>	<u>9.1</u>
Total Manufacturing Costs	60,000	58,000	3.4
Inv, Inc/(Dec): Labor & OH Content	<u>4,000</u>	<u>(4,000)</u>	
Cost of Sales	<u>64,000</u>	<u>54,000</u>	<u>18.5</u>
Gross Profit	36,000	36,000	0.0
Gross Profit as a Percent of Sales	36.0%	40.0%	

(This example corresponds with that in Figure 2.)

Figure 3.

has cash flow, but the traditional standard cost statements lied to us. They told us something bad was happening.

Why is that? The item called "inventory" on the balance sheet is comprised of two things. The first is the material content of the entire inventory. This is what's physically there. The second element is deferred labor and overhead. This represents the cost incurred to produce inventory that we

have not sold yet. When we do sell it these costs become a non-cash charge to profits in the period it is sold.

The alternate format P&L clearly shows this. The change in inventory has been displayed separately in its two elements. The material portion is netted against purchases, because as we consume the inventory we can reduce our purchases. The labor and overhead element is added to the total manufacturing costs and there is little, if any, offset. During the transition period there is little opportunity to temporarily reduce overhead until we normalize the inventory levels since most overhead is fixed.

Some would say that since we are not replenishing inventory at the rate it was sold during this period, we don't need all of the labor force. However, we must also insure that our human resource policies support the Lean strategy. Companies that successfully implement Lean quickly learn that most of the good ideas for productivity improvements come from the people doing the work. They know where the problems

are and in most cases have good ideas as to how to correct them.

But people will not work themselves out of a job, so in order to get significant productivity gains over the long haul the workforce must be given a qualified employment guarantee. This generally takes the form of a statement such as "No one will lose employment as a result of productivity gains." Therefore through this inventory transition period the only "relief" that can be obtained regarding labor costs is through reduced overtime and natural attrition. What do you do with the "excess" labor? Training, kaizens, aggressive implementation of the 5 Ss, insourcing from suppliers ...

Cash Flow Tells the Tale

Almost anyone in accounting and finance can follow an argument based on cash flow, and as previously mentioned; even though this company did not report increased profits it improved its cash position. Figure 4 shows cash generated from manufacturing for the last two years. Because of the improvement in inventory turns in this example, cash generated from manufacturing improved in excess of 23 percent. In order to estimate in advance the amount of cash that can be freed up from inventory we believe that companies that successfully implement Lean should be able to double their inventory turns in two years and quadruple them in four years.

Investment Management

The last dimension in transforming accounting to support the Lean enterprise is rethinking investment management. In most companies "investment management" makes people think of capital expenditures. In the Lean environment it takes on a broader definition. For example, most companies don't "plan" working capital. In the Lean business you should, month-by-month. Improving inventory turns is not something that should happen at the end of the year so as to make the metrics look good. It needs to happen continuously throughout the year, because in addition to

Comparison of Cash Flow from Manufacturing

	<u>This Year</u>	<u>Last Year</u>
Gross Profit	36,000	36,000
Equipment Depreciation	2,000	1,900
Building Depreciation	200	200
Change: Labor & OH in Inventory	<u>4000</u>	<u>(4000)</u>
Total Cash Flow from Manufacturing	42,000	34,100

Figure 4.

freeing up cash, it frees up lots of space, which accelerates the Lean transformation.

In addition to working capital, the investment plan should consider the number of people employed. We have been conditioned to think of people as expense, since that's how we account for them. But if we think of them as investments we change our behavior.

In the current economic environment most companies certainly have placed severe restrictions on hiring. But in good times it is relatively easy to "justify" an additional staffing position. If that position becomes a permanent addition to the company's infrastructure then we have made an investment.

Suppose the wage and benefit cost of that new position is \$50,000. Then over a 30-year career, using an 8% discount rate, that position has a present value of \$563,000. In your company, what type of justification do you have to go through to buy a half-million dollar machine?

We look at people as part of our infrastructure. When we consider the lifetime cost of each person, it becomes apparent that as we implement Lean and attrition takes place, we have to be very reluctant to replace that attrition. That's how the productivity gains that we achieve become actualized.

Becoming Lean also changes the way we look at capital spending. The first principle is "creativity before capital." For example, in the traditional environment when we talked about reducing machine setup time the engineers started talking about how much they would have to spend to achieve it. In the kaizen environment we learned that we could reduce setup times by 90 to 95 percent with a five-day kaizen event with no capital spending.

We also learned that full automation is expensive and tends to create a production environment with little flexibility. However, semi-automation (letting the machine do machine work and people do people work) costs a tiny fraction of full automation, plus it creates much more flexibility. The payoff from flexibility is great because operating

conditions, customer demand, and products are always changing.

Therefore, in the capital justification process we have to consider factors that may not be easily quantified. These include improvements in flexibility, quality, throughput, delivery, etc. In addition, in the justification process we should allow a direct offset for a permanent reduction in inventory. After all, if a particular capital expenditure can lead to a permanent reduction in inventory we are just trading one asset for another. Which is better ... inventory that can become obsolete or damaged, or plant capacity that is flexible enough to respond to changing customer demand on a timely basis?

Communicating the Change

We may all agree that transforming the value delivery process to Lean will yield significant benefits and recognize that it is a business strategy and not just some manufacturing tactic. However we have an unavoidable earnings problem to explain. As we bring inventories down, we create a negative charge to current income. How do we deal with that?

The answer is communication, and lots of it. We need to communicate with each of the stakeholders in the enterprise to insure that each one understands the benefits, and effect, on them. This includes employees, unions, suppliers, and eventually customers.

We need to communicate the purposes and logic of the accounting changes with auditors, banks, the board of directors, and shareholders. We need to communicate with the auditors because changing the business and accounting systems will have an effect on their audit plan. Waiting until they arrive on the scene to commence the audit can only cause confusion, and extra audit hours. That can be avoided if auditors are included in the discussions along the way.

If we have financial covenants that are stated in conventional terms (such as working capital ratio of 2 to 1) we may need to start a dialogue with our banks to modify them. Boards of directors and shareholders

need to be educated about the benefits of Lean and also of the short-term effect of reducing inventories on reported profits. If the short-term positive cash flow is shown side by side with the negative profit effects, the complete picture can be seen. It's possible to do; I've done it.

If the company is publicly traded, communicating with shareholders at this level of detail may be difficult so the target audience should be the analysts that follow the company's stock. They need to be educated in Lean and helped to understand all of its implications. And having them participate in a kaizen event probably wouldn't hurt.

Get Your Accounting Team on Board

What are the first steps to take to prevent the accounting team from becoming a barrier to the Lean transformation? The

first steps are education and participation. The accounting team must be included in all of the Lean education offered to operating employees. And they must participate in shop floor kaizens. They cannot be allowed to opt out. Only by doing so will they gain a full appreciation of the implications of Lean on the economics of the business and on the accounting systems. In this way they can become a full partner in the transformation process and not just bystanders throwing hand grenades of misinformation.

Orry Fiume recently retired as vice president finance and administration from The Wiremold Company.

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