2

Using Lead and Lag Measures to Communicate, Motivate, and Evaluate

Student Tutorial
Lead Indicators

Measures of outcomes of early value-chain operations that signal future outcomes of later operations.

The following measures can be used as lead indicators:

- Business & production process efficiency.
- Organizational learning and growth.
- Customer satisfaction and loyalty.
Lead Indicators

Can you think of some examples of lead indicators that you might use in business?
Lead Indicators

Can you think of some examples of lead indicators that you might use in business?

- A decrease in new home starts may indicate a future decrease in demand for appliances such as refrigerators or ovens.
- An increase in quality measures, may indicate a future increase in customer satisfaction.
- News of unrest in the Middle East may foretell an increase in the price of fuel and petroleum-based products.
Lag Indicators

Measures of final outcomes of management plans and their execution.

Lead and Lag relations among Indicators of Performance:

Organizational learning and growth → Business & production processes → Customer value → Financial performance
Lag Indicators

Can you think of some examples of lag indicators that you might use in business?
Lag Indicators

Can you think of some examples of lag indicators that you might use in business?

- Improved employee morale might indicate that a recent employee seminar was successful.
- Increased productivity might be a signal that a recent training course was successful.
- Improved quality can be a sign that using a higher grade material reduces defects.
Measures of Organizational Learning and Growth

**Employee capabilities**
Knowledge & skills that are indicators of the organization’s ability to meet future customer needs & generate new sales.

**Organizational Learning**
How employees use capabilities to create:
- new or improved business & production processes
- products & services
- customer data bases
- proprietary items, copyrights, or patents.
Measures of Organizational Learning and Growth

Measures include:

- Employee training & education
- Opportunities for improvement
- Innovativeness
- Product development time

Opportunities for improvement

Measuring Results: Process Efficiency

Process efficiency
- The ability to transform inputs into outputs at lowest cost.

Production processes
- Result directly in the production of products or services provided to external customers.

Business process
- Support or enable production processes.
Measuring Results: Process Efficiency

- High quality
- High productivity
- Low cycle time
- High throughput
Measuring Quality

**Internal Customers**
*(Click for definition)*

- If internal customers are satisfied, profitability of the production process is maximized.

**External Customers**
*(Click for definition)*

- If internal customers are NOT satisfied, external customers cannot be profitably satisfied.
Measuring Quality

Internal Customers
Employees involved in the next “downstream” process.

If internal customers are NOT satisfied, external customers cannot be profitably satisfied.

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(Click for definition)

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Ultimate users of products and services that generate profits for the organization.
Measuring Quality

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Measuring Productivity

Total Factor Productivity = Value of Goods & Services ÷ Total cost of Providing Goods & Services

Specific productivity measures compare:

Outcomes Valued by Customers to The scarcest or most valuable resources used to achieve the outcomes.
Measuring Productivity

Ure Company, Inc. is in the same industry as MST. Assume sales are $4,600,000 in 2000. Also assume that the cost of providing the product is $3,680,000. What would be Ure Company’s total factor productivity?
Measuring Productivity

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Total Factor Productivity = Value of Goods & Services ÷ Total cost of Providing Goods

\[
= \frac{4,600,000}{3,680,000}
\]

= 1.25
Measuring Throughput Efficiency

A measure of the amount of time spent adding value compared to the total cycle time.

Throughput Ratio = \frac{\text{Value-added Time}}{\text{Total Processing Time}}
Preventing Process Mistakes

1. It is easier and less costly to prevent mistakes than to fix them.

2. When mistakes do occur, lead indicators can identify problems before they become too serious.

**Six-Sigma Programs**, such as at Motorola, are designed to result in nearly error-free production processes.
Preventing Process Mistakes

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Six-Sigma Programs, such as at Motorola, are designed to result in nearly error-free production processes.

Six Sigma refers to a process that has a 99.9999998% probability of being error free. The concept was originally implemented by Motorola. Typically, Six Sigma processes result in an average of only 3.4 production defects for every 1,000,000 units produced.
Measuring Customer Satisfaction

Customer Satisfaction is the degree to which products and services meet customers’ needs.

Attributes of customer satisfaction include:

• Meeting customer needs.
• Meeting technical requirements.
• Delivering superior service before and after the sale.
• A commitment to work with the customer.
• Flexible, competent, and helpful employees.
• Company’s reliability and ability to meet commitments.
Measuring Customer Loyalty

Customer Loyalty is the tendency for existing customers to continue to obtain products and services from the same organization.

Measures include:

- % of sales to repeat customers
- Customer retention rate
Target Costing for Product Design

An approach for designing products to simultaneously meet both customer needs and company profit targets.

Compute target price.
Target Costing for Product Design

An approach for designing products to simultaneously meet both customer needs and company profit targets.

1. Compute target price.
2. Compute target cost per unit.

Target Cost per Unit = Expected market price over the life of the product - Required profit per unit
Target Costing for Product Design

An approach for designing products to simultaneously meet both customer needs and company profit targets.

1. Compute target price.
2. Compute target cost per unit.
3. Compute the currently feasible total cost.
Target Costing for Product Design

An approach for designing products to simultaneously meet both customer needs and company profit targets.

1. Compute target price.
2. Compute target cost per unit.
3. Compute the currently feasible total cost.
4. Compare total target cost to currently feasible total cost.
Target Costing for Product Design - Example

Dig Corp. produces titanium shovels. These shovels dig easier and last longer than traditional steel shovels. Dig Corp. currently sells 75,000 shovels per year at a sales price of $125 each. However, competing products set to hit the market in 6 weeks will drive prices immediately to a unit sales price of only $70 per shovel.

Dig Corp. must maintain a 30% profit margin. With the new sales price of $70, they expect sales to increase to 105,000 shovels per year. The current variable cost is $52 per shovel. Fixed costs are $1,200,000.

What is Dig’s cost reduction target?
Target Costing for Product Design - Example

1. Compute target price = ?

In this problem, this is given. Usually the target price must be estimated by careful study of prevailing and expected economic and market conditions.
Target Costing for Product Design - Example

Compute target price = $70

In this problem, this is given. Usually the target price must be estimated by careful study of prevailing and expected economic and market conditions.
Target Costing for Product Design - Example

1. Compute target price = $70

2. Compute target cost per unit = ?

"Compute target price = $70"
Target Costing for Product Design - Example

1. Compute target price = $70
2. Compute target cost per unit = $49

Target Cost per Unit

= $70 - ( $70 \times 30\% )

= $49
Target Costing for Product Design - Example

1. Compute target price = $70
2. Compute target cost per unit = $49
3. Compute the currently feasible total cost.
Target Costing for Product Design - Example

1. Compute target price = $70

2. Compute target cost per unit = $49

3. Compute the currently feasible total cost.

Currently Feasible Cost = (VC × Est. Sales) + FC

= ($52 × 105,000) + $1,200,000

= $6,660,000

Target price = $70

Target cost per unit = $49
Target Costing for Product Design - Example

1. Compute target price = $70
2. Compute target cost per unit = $49
3. Compute the currently feasible total cost.
4. Compare total target cost to currently feasible total cost = $?

Compute target price = $70
Compute target cost per unit = $49
Target Costing for Product Design - Example

1. Compute target price = $70

2. Compute target cost per unit = $49

3. Compute the currently feasible total cost.

4. Compare total target cost to currently feasible total cost = $1,515,000

Cost Reduction Target

Currently Feasible Cost = $6,660,000

- (Target Unit Cost × Est. Sales) = $1,515,000

Cost Reduction Target

Currently Feasible Cost = $1,515,000

- ( $49.00 × 105,000 ) = $1,515,000

Balanced Scorecard

A cause-and-effect model of lead and lag indicators of performance that demonstrates how changes in one operation cause or are balanced by changes in others.

Four major areas of performance:

1. Learning and growth.
2. Business and production process efficiency.
3. Customer value.
**Dimensions of performance**

Learning & growth

Business & production process efficiency

Customer value

Final performance

**Measures of performance**

Avg. employee education level

% of defective products

Process cycle time

% of on-time deliveries

Retention of existing customers

Return on Sales

Quantifying the Causal Relationships

A mathematical model that allows managers to estimate the effects on profitability from changes in activities.

The basic relationship model is:

\[ \delta Y = b(\delta X) \]
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A mathematical model that allows managers to estimate the effects on profitability from changes in activities.

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$$\delta Y = b(\delta X)$$

Weightings ($b$) are assigned to each relationship in the causal Balanced Scorecard Model.
Bennett Industries realizes that a simple 1% increase in on-time deliveries will lead to a .8% increase in customer satisfaction. A 1% increase in customer satisfaction will lead to a .3% increase in sales. If on-time delivery improves by 5%, what will be the effect on sales?
Balanced Scorecard - Example

If on-time delivery improves by 5%, what will be the effect on sales?
A 5% increase in on-time delivery results in a 4% increase in customer retention. This will lead, in turn, to a 1.2% increase in sales revenues!
End of Chapter 2

I always balance my scorecards before anyone else sees them!