

Backbone of the Lean Enterprise

Westec 2004

Society of Manufacturing Engineers

Presented by

James B. Ayers

Principal, CGR Management Consultants

Los Angeles

(310) 822-6720

jimayers@cgrmc.com

www.ayers-consulting.com

March 15, 2004



1

Jim Ayers' consulting practice is directed at operations strategy and profit improvement. He contributes frequently through professional societies, articles and books, and speaking to groups from diverse industries. In 2000, St. Lucie Press and APICS published his book, Handbook of Supply Chain Management. Jim also authored Improving Your Competitive Position, published by the Society of Manufacturing Engineers (SME). He edited Making Supply Chain Work: Design, Implementation, Partnerships, Technology, Profits for Auerbach Publishers. His latest is Supply Chain Project Management: A Structured Collaborative and Measurable Approach from St. Lucie Press. In 2002, he wrote a SME/CASA Blue Book, *Supply Chain Management, the Wheel and the Manufacturing Engineer*.

Jim consults in a variety of industries including aerospace and defense, software, and electronics. He holds MBA and MSIE degrees from Stanford and a BS with distinction from the US Naval Academy. On active duty, he served in submarines. Jim is a senior member of SME, a member of the Project Management Institute, the Council of Logistics Management, and the Institute of Management Consultants (IMC). He is a Certified Management Consultant (CMC) by IMC.

CGR Management Consultants specializes in supply chain management services for clients in manufacturing and distribution industries. CGR was founded in 1984 and has its principal office in Los Angeles.

What do these terms mean?

Enterprise



Lean



Backbone

2

These terms are from the title of the talk. However, there are many interpretations of each. The terms are listed in order in which a company should define them. The scope of the enterprise will determine the lean tools that apply most to them. The tools, in turn, set the specifications for the backbone needed to support their deployment. Here we consider "backbone" to include the processes, functions, and people required to implement and sustain a lean "operation." "Operation," in this case, includes one's own company and its supply chain partners.

The audience should share their perceptions of each term.

Key Points



- 1. The “enterprise” universe is expanding.**
- 2. Picking the “right” lean tool for the job at hand is challenging.**
- 3. A “backbone” infrastructure is required to implement lean in an expanding universe.**
- 4. Structured project management is essential.**

3

Here are four propositions that constitute key points of the presentation. The slides that follow will deal with each. A pointer in the upper right hand corner of each slide will tell us where we are in our list of four.

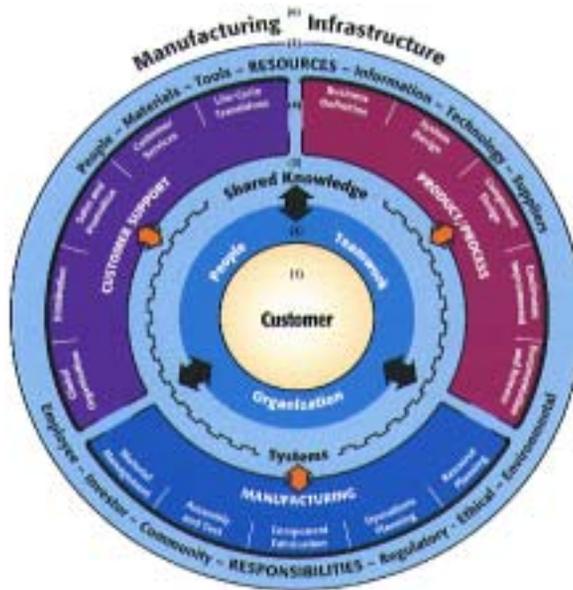
First, the definition of “enterprise” is expanding. No longer is the “enterprise” the company and a few suppliers and customers. Globalization and competitive pressures make it necessary to look wider for supply chain partners and markets to serve.

Second, there are many lean tools. In fact, just about any cost reduction technique can be considered a tool. Increasingly, “lean” and “six sigma” disciplines are crossing paths. Tools include analysis and deployment as well as engineering approaches. A management challenge, and a job for “backbone” functions, is matching the right tool with the needs of the enterprise.

Third, the backbone must support ongoing efforts to make a company and its supply chain lean. The backbone is the infrastructure; its absence often puts efforts to implement lean at risk. Organizations like SME and the Supply-Chain Council provide help in defining elements in the backbone.

Finally, project management techniques provide a structured, disciplined path from where we are to where we want to go. This is often lacking. The expanding enterprise universe makes project management all the more indispensable.

SME CASA Wheel – 1993



Copyright 1993 – Society of Manufacturing Engineers

4

The current version of the SME/CASA Wheel provides a model of the “enterprise.” It extends from Level 1 at the hub of the wheel, Customer, at the center out to Level 6, Manufacturing Infrastructure. Level 4 contains processes. These include not just Manufacturing but also Customer Support and Product/Process. These are glued together by Shared Knowledge and Systems.

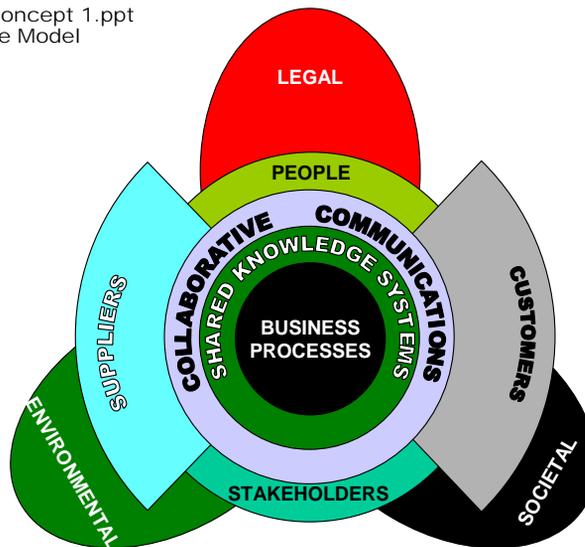
Processes listed in Level 4, Manufacturing, include Material Management, Assembly & Test, Component Fabrication, Operations Planning, and Resource Planning. Note that both planning (Operations Planning) and execution processes (Assembly & Test, Component Fabrication) are included.

According to the document that introduced the Wheel, this wheel is more externally oriented than the model it replaced. Elements include a customer-oriented mission, teams and networking, key process and their improvement, integration with the environment, and a lean organization.

How many companies make the ME responsible for improving or maintaining all the processes in the Wheel?

Wheel Update

Reinventing the Wheel Concept 1.ppt
Manufacturing Enterprise Model
November 2003
William A. Estrem Ph.D.
College of Business
University of St. Thomas



Copyright 2003 – Society of Manufacturing Engineers

5

Here is a candidate Wheel to update the 1993 version. It also takes an expanded view of the “enterprise” and is available at the SME Website (www.sme.org). In this Wheel, business processes are at the hub of the Wheel. Both Suppliers and Customers are prominently featured.

Processes presented in the detail that goes with the wheel are the following:

SOURCE, PLAN, DEFINE, MAKE, MARKET, SELL, DELIVER, RETURN, SUPPORT.

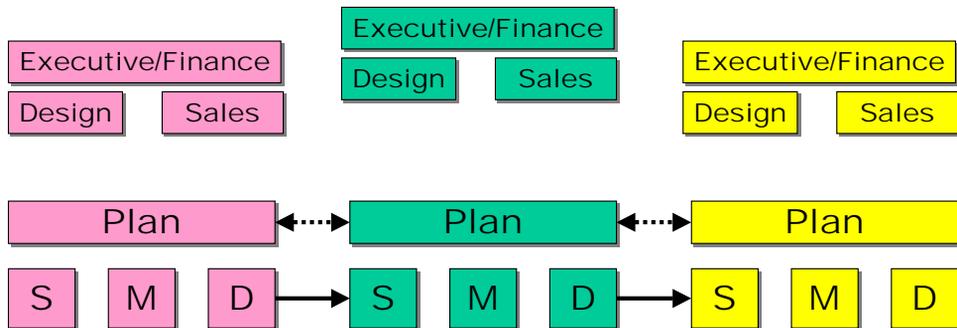
This list of processes is similar to that of the Supply-Chain Council’s SCOR model, discussed next. They reflect processes throughout the product life cycle from design inception to after-sales support, including return items.

This Wheel addresses systems for “collaborative communications” across multiple companies. Components of this collaboration include Applications, Content, and Infrastructure.

SCOR



SCOR
Execution Processes
 P – Plan
 S – Source
 M – Make
 D – Deliver



6

SCOR is a “Supply-Chain Operations Reference Model.” It is promulgated and maintained by the Supply-Chain Council. This is a non-profit organization consisting of companies, not individuals. If our company is in the middle of the chain (green in the figure), our supplier (on the left) is pink and our customer is yellow (on the right).

The Level 1 Execution processes in SCOR are Source, Make, and Deliver as shown on the slide. There is also a Return process which is omitted for simplicity. Plan includes processes that match supply and demand. In the diagram, physical flows are from left to right, from supplier to our company, to our customer. SCOR, at this time, doesn’t include Design or Marketing & Sales.

SCOR recommends that the supply chain be considered end-to-end from raw materials to end users.

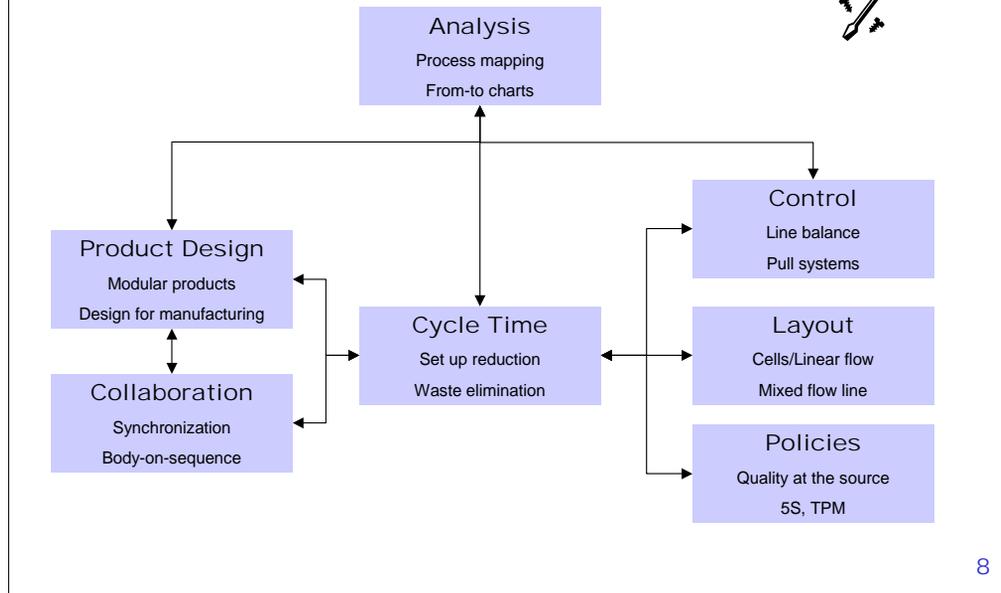
The model is hierarchical. What is shown on the slide are the Level 1 processes. The model consists of detailed process down two more levels to Level 3, Process Elements. These are considered generic to any supply chain. Level 4 and beyond processes are company specific.

“Enterprise” -- Summary

- Broad range of processes covered
- Not just shop floor
- Includes information sharing
- Emphasizes collaborative relationships

The slide summarizes the model from SME/CASA and the Supply-Chain Council. It fits with our proposition that the definition of “enterprise” is expanding. This expansion means the challenges of making that enterprise “lean” will also increase. For many companies, this involves a change in thinking. It may also require ME’s to rethink their jobs and the skills they need. Certainly, technical skills will not be enough. The ability to work in teams, sell change, and implement will grow in importance.

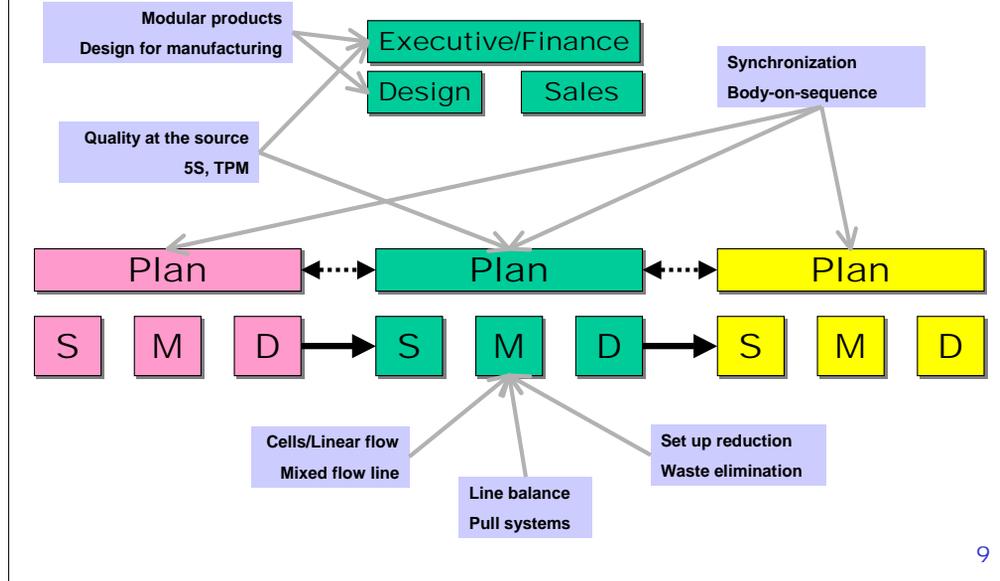
Lean Tools -- Examples



This presentation isn't intended to define all the tools associated with "lean." The slide does list examples of lean concepts (or policies) and tools and assigns them to categories. The tools include analysis techniques commonly employed to assess opportunities for lean technology.

The tools fall across a broad range. Those on the right (like cells, 5S, pull systems) are more commonly associated with lean. Those on the left like modular products involve other functions in the organization (design) and other companies like synchronization (collaboration with suppliers and customers).

Lean Tool Application



This slide overlays the tools with SCOR model processes. The point is that lean techniques, to be successful, require collaboration with other departments inside the organization and other companies in the supply chain. This leads to the subject of this presentation – the “backbone” required to implement and maintain a lean enterprise.

"Backbone" Defined



1. Management mindset
2. Enable processes for continuity
3. Clear strategy that defines process requirements & performance metrics
4. Project & portfolio management

The slide shows four backbone components. The first is "management mindset." This is the set of beliefs and attitudes toward lean and its role. Perhaps the most important component is management's view of the enterprise. A limited view, such as only including shop floor activity, will limit application of lean. There is a danger in a too-broad view also. The company may not be focused enough, diluting its effort, and not getting anything done.

The second component consists of enable processes. This term is from SCOR which defines enable processes as those "that prepare, maintain, or manage information or relationships on which planning and execution processes rely." CGR's experience indicates that lack of enable processes is a principal obstacle to improvement. SCOR supply chain processes, described later, are a good beginning.

A strategy for competing is also needed for successful lean manufacturing. In fact, the strategy defines success. The strategy tells the lean implementation team what processes must be lean and what those processes must do in terms of serving customers. The strategy also enables the setting of priorities for process improvements.

Most lean projects do not occur in a vacuum. Other projects are ongoing while lean techniques are being introduced. For example, in a larger organization new systems and products may be in the process of introduction. Separate process improvements will compete with each other for scarce resources. Portfolio management must allocate resources among these initiatives. Another important function of project management, item #4, is to define the scope of lean projects. This task must strike a balance between the results sought, the time requirements, and the strategic contribution of the lean improvement effort.

Management Mindset



- Top-Down
 - Big picture
 - Planning
 - Wide sphere of influence
 - Supply chain perspective
 - All enterprise costs
 - Portfolio focus
 - Business skills
 - Linked improvements
 - Time frame: long
 - Project role -- monitor
- Bottom-Up
 - Local picture
 - Execution
 - Narrow sphere of influence
 - Work center perspective
 - Local process costs
 - Project focus
 - Technical skills
 - Isolated improvements
 - Time frame: short
 - Project role -- execute

There are two perspectives to consider when implementing lean and other improvements. The “top down” mindset covers the big issues often assigned to the senior management team. This includes roles like the CEO, COO, CFO, CIO, the marketing executive, the product development executive, and others in key roles. The “bottom up” mindset encompasses issues of day-to-day process execution. It is the province of first line and middle management. It is no less important than the top down perspective; one mindset can’t succeed without success in the other.

The balance scale symbolizes the need to get the mix correct for the business. This task requires “management art” since there are no absolute formula solutions. Much will depend on the company’s position in the supply chain, its products, and its markets. The weaker its role in the supply chain, the more competitive its market, and the more mature its products, the more likely the company will adopt a “bottom up” bias. Lean initiatives will often emphasize cost reductions. A company with innovative products commanding high margins will favor a “top down” perspective. Initiatives will emphasize flexibility, lead-time reduction, and new product design.

Many companies are too bottom-up focused. This is the legacy of traditional roles of ME’s and an emphasis on cost reductions in shop floor manufacturing. Despite claims of success, too many lean projects are isolated and have little overall impact.

SCOR Enable Processes



	1	2	3	4	5	6	7	8	9	
	Maintain business rules	Assess performance	Manage data	Manage inventory	Manage capital assets	Manage transportation	Manage supply chain configuration	Manage regulatory compliance	Align supply chain & financials	
PLAN	2.0	1.4	1.6	2.6	2.5	3.3	1.4	3.0	1.8	2.2
SOURCE	2.2	2.4	1.5	1.8	2.5	3.5	2.4	2.8	1.5	2.3
MAKE	2.0	2.3	2.6	2.0	2.0	3.0	1.7	2.3	2.0	2.2
DELIVER	2.6	3.0	2.3	2.3	3.5	2.8	2.4	3.2	2.8	2.8
RETURN	2.6	2.4	2.0	1.8	2.0	3.3	1.0	2.3	1.5	2.1
	2.3	2.3	2.0	2.1	2.5	3.2	1.8	2.7	1.9	

12

SCOR does a valuable service in identifying the need for enable processes (shown along the top of the table in yellow) and providing nine such processes for consideration. In practice, a company will use some of these and add others needed for their business. Enable processes are to the supply chain management what pavement is to highways. Without the pavement, the road is rough.

The slide contains an example of a company's self-assessment of the enable processes. Each evaluation rates how well company enable processes support plan and execution processes. Shaded cells in the table (rose colored) highlight low rankings.

Below is a brief description of each enable process.

Establish and manage rules: Policies used to make decisions in planning and execution processes.

Assess performance: Having measurable objectives and the means to track performance.

Manage data: Definition of and maintenance of supply chain related operational and planning data.

Manage inventory: Providing the physical capabilities to accommodate inventory.

Manage capital assets: Tracking of capital assets employed in the supply chain.

Manage transportation: Developing and providing transportation resources across the supply chain.

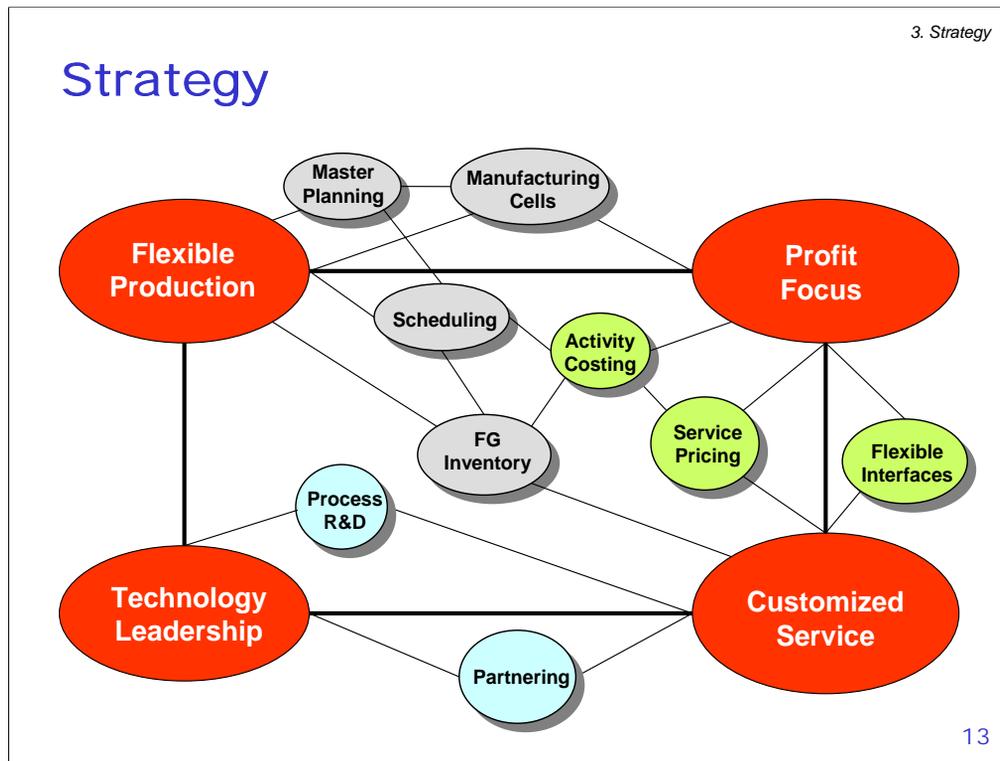
Manage supply chain configuration: Having standards for and maintaining documentation of supply chain components.

Manage regulatory compliance: Assuring that supply chain operations are compliant with government regulations

Align supply chain and financials: Assuring that financial goals and assumptions reflect supply chain realities.

Manage supplier agreements: Establishing and maintaining sourcing or frame agreements with selected suppliers.

Strategy



13

Every company has a strategy. It emerges in company processes and improvement efforts. The strategy may not be the result of a conscious design, such as the one provided by a formal planning process. In the figure, the strategy product is called an “activity system” and is described in the referenced Blue Book from SME/CASA. Michael Porter, an academic leader in strategic planning, developed the technique. His methodology has particular merit for those looking for direction in using their operations to gain strategic advantages.

The input of the process is a series of choices, or themes, (large ovals in red) that anchor activities that implement the choice. Top management makes these choices.

The activities are the smaller ovals shown in different colors. These activities contain the processes that have to be created or modified to meet the intent of the strategy. The four gray activities (upper left side) are those associated most closely with shop floor manufacturing and control. The three green activities (in the middle on the right) support customer-facing themes for service and achieving more profitable service business. The two blue activities (on the lower left) address joint effort for product development.

Those responsible for lean implementation should participate in developing the activity system.

PMBOK®*



Knowledge Area	Priority for Lean
Integration Management	High, strategic, multi-company projects.
Scope Management	High, strategic, multi-company projects, deliverables measurement.
Time Management	Low, like most projects.
Cost Management	Medium, can be a factor in incentive sharing between partners
Quality Management	Medium, strategic projects hard to measure.
Human Resources	High, requires training, multi-company.
Communications Management	Medium, many involved depending on scope.
Risk Management	High, but it varies by project. No risk, no gain applies.
Procurement Management	High, if purchases involved. Low if not so.

* Project management Body of Knowledge from the Project Management Institute (PMI)

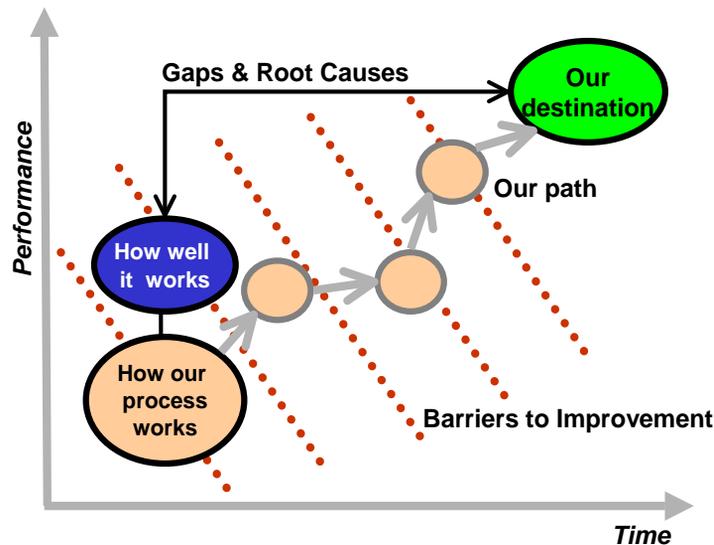
14

The project management discipline has a lot to offer lean implementation efforts. In a larger organization, in particular, there are likely to be numerous projects or subprojects in implementing lean. Standardization of procedures, adapted to the needs of the company, will reduce the risk of these projects not being successful.

The slide shows the nine areas of project management knowledge. The PMBOK Guide - 2000 Edition from the Project Management Institute documents each of these. The referenced book by Jim Ayers describes the application of PMBOK in supply chain improvements. These concepts apply to lean implementation as well.

The right hand column is an estimate of the importance of each knowledge area for lean implementation. This will vary from company to company and project to project.

General Project Structure



15

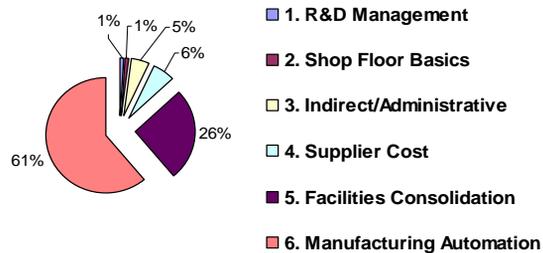
One demonstration of project management ability, or maturity, is the presence of a standard methodology for each project. This one is proven in its application to many projects. This process may be contained within a department of a company, cross department boundaries, or a multi-company process. The sequential improvements in performance can be part of a single project, or there can be a project for each move, as shown in the three small circles between the current situation and the destination in the upper right (green).

Barriers to improvement are particularly important; the project structure can go a long way toward avoiding these. CGR has identified the following as common barriers:

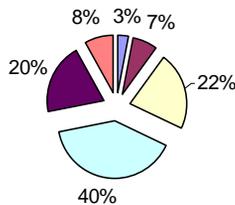
- No focus – we don't follow through
 - Executive disconnect
 - Little strategy or consensus
- Confusion – we don't understand
 - Definition of "enterprise"
 - No cross-company accounting (top down versus bottom up)
 - Technology
- Motivators – Objectives are fuzzy or wrong
 - Conflicting measures
 - Poor mission definition for manufacturing
- Boundaries – our influence is limited
 - "Pockets" of lean implementation
 - Going alone without partners
- Rigidity – we are slow
 - Poor implementation skills
 - Poor project management discipline
 - Lack of lean technical skills/tools

Portfolio Management

5 Year Cost



5 Year Benefits (5x Cost)



16

Another project management responsibility is oversight of all the projects in the portfolio. This function involves new project initiation, discontinuing an ongoing project, and modifying the direction of an existing project.

This task is aided by a cost model to weigh the cost and benefits of a potential or existing project. The case study above illustrates the use of such a model. The upper pie chart shows the cost of improvement projects (both capital and expense) over a five year period. The costs are divided into the six categories of operating cost; projects in each category will seek reduction in these costs. In this case the goals was a 33% reduction in the baseline over a five-year implementation period.

The benefits are shown in the lower pie chart. The benefits are expected to be five times the cost, but space doesn't permit showing this scale. Note that capital expenditures for manufacturing technology are the largest share of project cost, but the smallest share savings. Investments in supplier costs (6% of project expenses) produce 40% of the savings. In this case, the project cost in the supplier category were \$9 million; the benefits were estimated to be over \$150 million.

Whatever the size of the company, a cost model will help make portfolio decisions. See SME Technical Paper, "Application of Computer-assisted Techniques to Indirect Cost Identification and Reduction" on the SME website.

References

- "Reinventing the Wheel Concept 1.ppt"
Manufacturing Enterprise Model
November 2003
 - William A. Estrem Ph.D.
College of Business
University of St. Thomas
1000 LaSalle TMH 343
Minneapolis, MN 55403-2005 Phone (651) 962-4415 FAX (651) 962-4210
waestrem@stthomas.edu
- "Supply Chain Management (SCM), the Wheel and the Manufacturing Engineer, CASA/SME Blue Book Series 2002
 - James B. Ayers, CGR Management Consultants
- Supply Chain Project Management, St. Lucie Press, 2004.
 - James B. Ayers, CGR Management Consultants