

# MANUFACTURING

## Winning at the Margins

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*“A man who does not think and plan long ahead will find trouble right at his door.”*

Confucius

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Manufacturing is the delivery mechanism of the business: providing both what the business sells and how that product gets to market. It is an engine driving the work in purchasing, production, distribution, logistics and inventory management. That engine depends on input from the frontline functions of the business—Sales, Marketing and Finance—and it has responsibility for the quality and consistency that are so crucial in life sciences businesses.

Of all departments, Manufacturing has dealt the longest with the competitive situation described in Tom Friedman’s book *The World is Flat*. Offshore and outsourced production, technology-enabled process excellence, and supply chain integration are part of the relentless drive for lower costs. After more than a decade of investment and continuous improvement initiatives, companies have achieved what major cost savings are possible. Managing and winning at the margins is the new competitive area for Manufacturing.

However your company organizes Manufacturing, three critical barriers prevent managers from working the margins to deliver the best possible performance.

### **Barrier 1: *The operational back end can’t see where it’s going without the frontline’s vision***

Manufacturing depends on accurate and constantly updated information on what is required by customers. If you don’t have accurate information about the demand (both volume and variety) for products, you stand to lose operational efficiency and profit margin. With better information and plans, you avoid emergency production runs to satisfy unforeseen customer demand. You reduce the need for production system change-over and setup, and so profit margins are higher. You can match production volume with customer demand to reduce inventory.

### **Barrier 2: *Process bottlenecks and downtime***

Manufacturing continuously competes against time. Can this process be faster? Can workflow processes be re-engineered and simplified to gain time? The more steps between start and finish, the more bottlenecks and downtime risk may be hidden in them. The time to complete a series of process tasks is inflated by waiting periods; in some situations, actual process time can be as low as five to ten percent of the total time from start to finish. When only one-tenth of the time used is productive, reducing such waste is a worthy prize. You must identify and eliminate predictable process time-wasters. While many solutions may be internal—such as innovation, changes in processes or upgrades to IT infrastructure—you may decide your business is better served by outsourcing to a specialist with technical and scale advantages.

Information sweet spots help generate continuous intelligence loops on the real cost of bottlenecks and downtime, showing you the benefits of increased automation or specialization.

### **Barrier 3: *In a fast-paced, just-in-time economy, cost averages disguise cost reality***

With the just-in-time approach to Manufacturing, new and changing customer requirements regularly affect workflow. It is no longer sufficient to use the standard costing analysis designed for industrial companies with long production runs. That approach may disguise significant variances in actual process performance costs. Customers who appear profitable on a standard cost basis may not be in fact.

By breaking down work processes into discrete activities and measuring them with accurate activity indicators, you can achieve real-time costing. The best indicators will vary with the situation. The more detailed this activity breakdown, the more accurate your understanding of actual costs. Understanding and analyzing the information sweet spots lets Manufacturing identify process patterns and suggest cost savings.

For example, a given production run requires a number of operational steps, starting with an order and ending with delivery. A simple description of the work process steps includes:

- Order confirmation
- Production planning
- Set-up
- Tablet pressing / production run
- Cleaning
- Packaging and labeling
- Maintenance
- Quality control
- Warehousing
- Dispatch
- Carrier routing

Analyzing the activity, the company realizes:

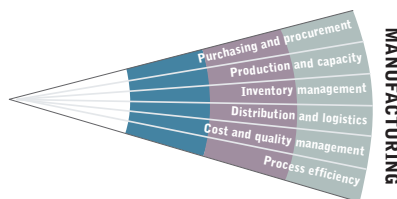
- Shorter production runs mean 30 percent downtime
- Quality during the second shift is 10 per cent below that of the first shift
- Customer specific packaging is 20 percent less efficient

Based on this information, the business now understands where it is losing money or costs are higher. Using a standard costing approach would never have highlighted this cost reality. Information sweet spots that let you understand what drives the larger cost categories will have an immediate and sizeable impact on managing actual costs.

### Delivering on the Promise Made to the Customer

For Manufacturing to win at the margins, every day and every shift must balance the need to reduce costs while staying agile enough to respond to new customer demands. In life sciences companies, Manufacturing has the responsibility to lead six core areas of decision-making:

- **Purchasing and procurement** → Ensuring timely and cost-effective input of resources
- **Production and capacity** → Generating timely output in the face of uncertain demand, complicated processes and variances in input
- **Inventory management** → Understanding the balance between holding cash and delivering on customer service requirements
- **Distribution and logistics** → Achieving efficient distribution and delivery
- **Cost and quality management** → Balancing the need to reduce costs with the equal requirement to deliver on regulatory and quality standards
- **Process efficiency** → Designing a process to monitor and analyze performance benchmarks to find opportunities for greater efficiency



**Purchasing and Procurement**

The purchasing and procurement decision area manages both input costs and supply requirements. These inputs have to conform and be managed to the highest handling standards and yet also conform to cost-saving opportunities. Effectively managing these costs will bring savings directly to the bottom line. For every one percent gained in input cost savings, somewhere between 0.25 percent and 0.5 percent typically will be earned as profit. This is a significant return on investment when compared with other investments and project returns. In addition to cost, the procurement personnel must ensure inputs arrive in a timely manner. Inputs arriving too late threaten production and customer delivery; inputs arriving too early cause unnecessary inventory build-up. Equally certain quality compliance standards may require suppliers to guarantee certain performance or tolerance levels that need to be actively monitored by Purchasing.

GOALS	METRICS	DIMENSIONS
Purchase Price/Unit (\$)	Actual Lead Days (#)	Fiscal Week
Reject Rate (%)	Contract Quantity (#)	Fiscal Year
Supplier Timeliness (%)	Contract Remaining (#)	Quarter
	Credit Rating (W)	Month
	List Price/Unit (\$)	Week
	Purchase Order Cost (\$)	Raw Material Category
	Purchase Orders (#)	Sub-Category
	Purchase Units (#)	RM Name
	Quality Rating (#)	Tag #
	Quoted Lead Days (#)	RM Suppliers
	Supplier Discount (\$)	Type
	Supplier Discount (%)	Supplier
	Supplier Perf. Rating	Shipment Type/Bill of Lading (#)
		Shipment Type
		Shipment Bill of Lading (#)
		Vendor Status
		Status
		Contract/Spot

All these input concerns need to be carefully balanced to decide upon the optimum procurement approach. In the short term, your decisions must include how to respond to shortage problems, price increases and delivery delays. For example, you must decide whether to tie up cash in five days of inventory to buffer against recent problems in delivery. Long-term decisions include determining your supplier strategy.

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
Purchasing	Executives	*		
	Managers	*		
	Analysts	*		
	Professionals	*		
Distribution	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Audit	Executives			*
	Managers	*		
	Analysts	*		
Operations / Production	Executives			*
	Managers		*	
	Analysts		*	

For example, how do you balance the savings and/or better quality from exclusive supplier agreements against the risk of creating unacceptable dependencies? These decisions require information on specifications, procurement tenders, price quotations and vendor performance assessments. You cannot make the necessary purchasing trade-offs without access to information sweet spots. The better you understand the trade-offs, the more finely tuned is your ability to win at the margins.

### Production and Capacity

Without product, there is no business. Accordingly, this decision area is the backbone of the business. Production management depends on order fulfillment and expected sales information. Ideally, you know product demand well in advance to be able to plan capacity and schedule production runs for given products. This minimizes downtime and maximizes machine loadings.

Changing a schedule, especially for an urgent customer need, means rearranging existing production schedules and results in extra setup time, change-over time, idle time and lost capacity. *The bottom line?* It reduces your ability to win at the margins. As with any chain of interconnected links, changes in demand affect your input requirements. The domino effect of changes spreads across the whole Manufacturing process, creating a series of costly capacity management responses.

To counter this, you must communicate new information immediately so that Manufacturing can adjust its schedule in the most effective manner. You must also communicate potential delays to Customer Service for resolution. Closely monitoring this ebb and flow of changing circumstances through production information sweet spots lets Manufacturing maximize its use of production capacity.

GOALS	METRICS	DIMENSIONS
Backlog (%)	Avg. Units per Order (#)	Fiscal Week
Capacity Utilization (%)	Avg. Units/Production Run (#)	Fiscal Year
Systems Up Time (%)	Fixed Production Cost (\$/%)	Quarter
	Marginal Production Cost (\$/%)	Month
	Production Hours (#)	Week
	Production/Batch Runs (#)	Machines
	Scheduled Production Hours (#)	Equipment Type
	Set-Up Time (#)	Machine
	Units in Production Schedule (#)	Mfg. Product Run Number
	Units Produced (#)	Product Line
	Units Produced/Hour (#)	SKU
	Units Reworked (#)	Component
	Variable Production Cost (\$/%)	Part Number
	WIP End (#)	Run Number
	WIP In (#)	Organization
	WIP Out (#)	Division
		Department
		Org. Code
		Production Process
		Production Process
		Work Function

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
Operations / Production	Executives	*		
	Managers	*		
	Analysts	*		
	Professionals	*		
Audit	Executives			*
	Professionals	*		
Distribution	Executives			*
	Managers		*	
	Professionals		*	
Finance	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Purchasing	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Customer Service	Executives			*
	Analysts		*	

**Inventory Management**

Shipping appropriately bundled products to fill customer orders is the concern of the inventory management decision area. Balancing customer requirements, speed of order fulfillment and the volume of buffer stock you need to hold are key. The principle of holding buffer inventory is simple—but the larger your product range, the greater the complications. At one level greater product customization—for example, different packaging, size, drug potency, treatment requirements, etc.—is useful for sales and marketing purposes, and SKU (stock keeping unit) proliferation will offer greater opportunity to tailor to various customer and channels requirements. But the greater this proliferation, the more complex the inventory management, including managing slow-moving stock and minimizing the risk associated with products getting “out-of-date.” The fact that buffer stock ties up cash compounds the urgency of decisions. If you hold one month of buffer inventory, one month of production has not earned a return—equivalent to more than eight percent (one-twelfth) of a year’s production cost. But inventory management must also determine the financial and customer consequences of removing buffer stock from inventory. Tying up 40 to 50 percent of your inventory with products that are rarely ordered makes no sense unless key customers highly value these products.

Understanding the full implications of these decisions requires access to information sweet spots. In the example above, it means knowing the total annual sales and profit value of each SKU. Most will earn less than one percent of total margin. *Which ones? Of these, how many go to your most important customers, and are they seen as critical components of the order?* If order frequency is low and irregular, the case for culling these product items increases. Even if significant savings will result from this product cull, you must align the decision with input from other functions such as Sales, Customer Service and Regulatory Affairs. *How should you handle the notification, and what are the contingency measures if key customers complain?* Sales does not like bringing bad news to customers and expects a clear justification for such business decisions. Factual reasons will be useful when communicating your rationale to customers.

GOALS	METRICS	DIMENSIONS
Inventory (\$)	Avg. FG (#)	Fiscal Week
Inventory / Days (%)	Avg. FG (\$)	Fiscal Year
Inventory Turns (#)	Avg. Units per Order (#)	Quarter
Product SKUs (#)	FG End (#)	Month
	FG End (\$)	Week
	FG In (#)	Product SKU
	FG In, Carrying Cost (\$)	Product Line
	FG Out (#)	Brand
	Product SKU Order Frequency (#)	SKU
	Time since Last Order (#)	Warehouse
		Region
		District
		Warehouse

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
Operations / Production	Executives	*		
	Managers	*		
	Analysts	*		
	Professionals	*		
Audit	Executives			*
	Managers	*		
	Professionals	*		
Distribution	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Finance	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Purchasing	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Customer Service	Executives			*
	Analysts		*	

### Distribution and Logistics

This decision area includes managing quality, cost and timeliness of distribution and delivery. Short-term issues require the handling of customer orders and shipping using the most efficient routing, scheduling and equipment. Long-term issues require determining whether you can reduce mileage costs, improve delivery execution and ideally exceed customer service needs. The operational infrastructure to distribute and deliver customer goods is intricate and costly. Many companies work with third-party carriers, distributors or wholesalers for their expertise. Distributors specialize in particular channels, routes and/or territories, and can distribute more quickly and efficiently than most manufacturers. Strategically placed distribution warehouses can be an advantage to, and extension of, your sales force.

GOALS	METRICS	DIMENSIONS	
Damaged Units (%)	Avg. Actual Lead Days (#)	Billing Customer	Product SKU
Distribution Cost (\$)	Avg. Quoted Lead Days (#)	Category	Product Line
On-Time Unit Delivery (%)	Damaged Units (\$)	Customer Name	Brand
Price/100miles (\$)	Delivery Frequency (#)	Carrier/Distributor	SKU
	Insurance Cost (\$)	Distributor/Carrier Type	Shipment Type/BOL (#)
	Lead Days (%)	Carrier	Shipment Type
	Order Size (#)	Carrier Activity Status	Shipment BOL (#)
	Shipments On Time (%)	Activity Status	Ship-To Location
	Total Shipments (#)	Carrier	Region
	Units Delivered On Time (%)	Carrier Region	State/Province
	Units Shipped (#)	Region	County
		State/Province	City
		County	Zip Code/Postal Code
		Zip Code/Postal Code	
		Fiscal Month	
		Year	
		Quarter	
		Month	

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
Distribution	Executives	*		
	Managers	*		
	Analysts	*		
	Professionals	*		
Finance	Executives			*
	Managers		*	
	Analysts		*	
	Professionals		*	
Purchasing	Executives			*
	Managers	*		
	Analysts	*		
Operations/Production	Executives			*
	Managers	*		
	Analysts	*		
Customer Service	Executives			*
	Analysts	*		
Audit	Executives			*

While outsourcing makes sense on many levels, it does mean you lose direct control and have to accept the risks that come with loss of control. Managing such risks requires negotiating and monitoring distributor agreements with clear terms and commercial guidelines. Identifying, managing and evaluating the most effective distribution and logistics routes for customers or prospects draws on the following information sweet spots:

- **Order processing** → Editing, recording, credit control, stock allocation, vehicle route, delivery sequence, customer delivery requests
- **Handling characteristics** → Ease of handling and stacking, susceptibility to damage, special requirements (e.g., temperature)
- **Packaging** → Duration and type of journey, security, insurance
- **Routing and scheduling** → Order size, transport capacity, customer destination network, delivery frequency

**Cost and Quality Management**

In cost and quality management, you balance cost savings in one area against potential quality issues, downtime or customer complaints. Purchasing may find a new, lower-cost supplier, but the consequence may be the unacceptable risk at failing on quality, compliance and regulatory requirements. A product recall due to failures of tamper-free packaging can have catastrophic cost implications which do not compensate for the packaging savings made by a supplier switch. *What is best for the business?*

You need to understand cost variances and their impacts. By contrasting cost differences, you can benchmark performance, identify patterns and understand the root causes of cost differences. You also need to understand and analyze the value and cost of preventative measures that ensure quality such as training, appraising incoming materials, manufacturing processes and inspections. The more you examine measurable work activities and the more detailed your breakdown of costs, the more detailed your understanding will be of the root causes of variances in those costs. Measuring and monitoring must be integrated with quality expectations to understand the effect of changes.

GOALS	METRICS	DIMENSIONS
Failure Cost (\$)	Defects (#)	Fiscal Month
QC Reject Rate (%)	QC Cost (\$)	Year
	QC Defects Fixed (#)	Quarter
	QC Units Sampled (#)	Month
		Mfg. Product Component
		Product Line
		SKU
		Component
		Product SKU
		Product Line
		Brand
		SKU
		QC Defect Issues
		QC Defect Issues
		QC Tolerance Standards
		QC Tolerance Ranges

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
<b>Operations / Production</b>	Executives Managers Analysts Professionals	• • • •		
<b>Product Development</b>	Executives Managers Analysts Professionals		• • •	•
<b>Audit</b>	Executives Managers Professionals	• •		•
<b>Customer Service</b>	Executives Analysts		•	•
<b>Finance</b>	Executives Analysts		•	•
<b>Marketing</b>	Executives Analysts		•	•
<b>Purchasing</b>	Executives Analysts		•	•
<b>Sales</b>	Executives Analysts		•	•
<b>Distribution</b>	Analysts		•	

*“Improved access to operational and patient management data is helping to improve organizational performance.”*

Richard Johnson, Head of Information, Royal Cornwall Hospital NHS Trust



### Process Efficiency

Process efficiency management looks at ways to improve operations and supply chains. This means looking for performance outliers and understanding why they occur. There are three areas where well-designed comparative performance metrics can make the difference between an industry follower and a leader:

- Internal operational processes
- External developments and trends
- Competitive benchmarking

Your internal operational processes are most familiar to you, and the easiest to analyze. For example, if Purchasing’s “cost per dollar of purchase” is a benchmark, then an unusual increase in this index may indicate two things. Either purchasing costs have increased or purchases have decreased. You must determine whether purchasing efficiency has gone down or if sales have slumped. Another possible benchmark is “dollars of sales per order.”

If this metric is decreasing, it can indicate that the business is filling more orders for the same dollar total in sales. This may mean that costs have risen without an accompanying increase in sales—but it may instead indicate that you need to re-engineer the business to handle smaller orders. Taking advantage of external developments and trends requires looking outside your company. *Should you shift to low-labor-cost economies for cheaper manufacturing or services such as call centers? Are there new manufacturing techniques, equipment or technologies that can introduce dramatic efficiencies?*

GOALS	METRICS	DIMENSIONS
Operational Failures (#)	Avg. Units/Production Run (#)	Fiscal Month
Process Cost (\$)	Downtime Cost (\$)	Year
Process Value-Add (\$)	Maintenance Cost (\$)	Quarter
	Process Steps (#)	Month
	Production/Batch Runs (#)	Mfg. Product Component
	Scheduled Production Hours (H)	Product Line
	Set-Up Cost (\$)	SKU
		Component
		Product SKU
		Product Line
		Brand
		SKU
		Production Process
		Production Process
		Work Function

FUNCTION	DECISION ROLES	PRIMARY WORK	CONTRIBUTORY	STATUS
Production	Executives Analysts Managers Professionals	• • • •		
Finance	Managers Analysts		•	•
IT / Systems	Managers Analysts		•	•
Purchasing	Managers Analysts		•	•
Distribution	Managers Analysts		•	•
Sales	Analysts			•

Failing to follow up on these external efficiency developments may jeopardize your competitive position. Beyond this focus, many leading businesses extend their monitoring activities to their competitors. Simple comparative benchmarks such as sales per employee, volume output per employee, inventory levels, number of warehouses and others will help identify performance differences. With these identified, you can determine the actions you need to take.

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*“We have given users real-time visibility into business operations.”*

George Papmitrou, Director of Information Services, Aspect Medical Systems

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- Production & Capacity**
  - Capacity Utilization (%)
  - Systems Up Time (%)
  - Backlog (%)
  - Fixed Production Cost (\$/%)
  - Marginal Production Cost (\$/%)
  - Units Produced (#)
  - Variable Production Cost (\$/%)
- Process Efficiency**
  - Operational Failures (#)
  - Process Cost (\$)
  - Process Value-Add (\$)
  - Downtime Cost (\$)
  - Failures (#)
  - Maintenance Cost (\$)
  - Set-Up Cost (\$)

- Dimensions**
  - Fiscal Year/Month/Week
  - Billing Customer/Category
  - Mfg. Product Run Number
  - Machine Type/Equipment Type
  - Production Process
  - Product Brand/Product Line
  - Organization/Department
  - Market Segment

	Total Year	Jan	Feb	Mar	Q1
Systems Up Time (%)	\$	\$	\$	\$	\$
Backlog (%)	\$	\$	\$	\$	\$
Fixed Production Cost (\$/%)	\$	\$	\$	\$	\$
Marginal Production Cost (\$/%)	\$	\$	\$	\$	\$
Process Value-Add (\$)	\$	\$	\$	\$	\$
Downtime Cost (\$)	\$	\$	\$	\$	\$
Maintenance Cost (\$)	\$	\$	\$	\$	\$

*The Production & Capacity and Process Efficiency decision areas illustrate how Manufacturing function can monitor its performance, allocate resources and set plans for financial and operational targets.*