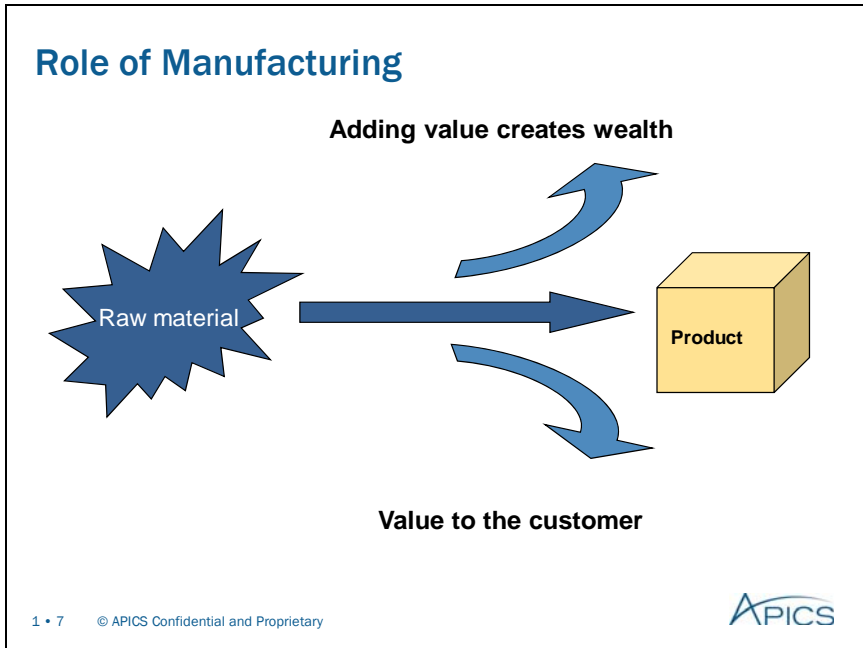


## Introduction to Manufacturing

Reference: *Introduction to Materials Management*, Arnold et al., 7<sup>th</sup> edition, chap. 1.; *United Nations Global Compact Brochure: Corporate Sustainability in the World Economy*, February 2011; *United Nations Global Compact Management Model: Framework for Implementation*, June 2010.



## Introduction to Manufacturing

### Role of Manufacturing

#### **Wealth Creation**

The primary goal of manufacturing is to create value for producers and customers. In this way, wealth is created for society as a whole.

For manufacturers, value is created by transforming raw materials and ideas into finished products and services that meet customer needs. This process incurs the cost of materials, labor, and overhead. When the product is sold for more than the cost to make it, it creates a profit that represents the value added to the product. Profit represents wealth for stockholders and generates a return on their investment in the business.

Society as a whole can benefit from profitable manufacturing through the multiplier effect. The company's suppliers create wealth in the same way, as do their suppliers. Presumably, the wages paid to employees creates wealth for them in the form of net worth, or savings and net assets.

Manufacturing is an important part of any society's economy. Producing the right goods and services efficiently is a major value-adding activity with positive impacts on aggregate wealth and standard of living.

#### **Value to the Customer**

An important objective of manufacturing is to provide value to the customer. Value is defined as the worth of an item, good, or service. It also can be defined as what the customer is willing to pay for.

As you will learn later in this course, through *productivity* improvement systems such as lean manufacturers strive continuously to eliminate waste, or unnecessary costs, from the production process because customers are not willing to pay for it. Through *quality* improvement systems, manufacturers can use methods to determine the features and functions of a product that customers find to be of value.

Value can be provided by making products that meet customer needs. In manufacturing, the focus is on the conversion of raw materials—such as minerals, metals, wood, or electronic components—into products that meet customer needs, such as automobiles, houses, and electronics.

## United Nations Global Compact

- Voluntary strategic policy initiative for businesses
- Alignment of business operations with principles in four areas:
  - human rights
  - labor practices
  - environment
  - anti-corruption
- Adoption of UN Global Compact Management Model

Source: *United Nations Global Compact Brochure: Corporate Sustainability in the World Economy*, February 2011

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## Ten Principles

Human rights

- 1 – Support and protect internationally proclaimed human rights.
- 2 – Ensure non-complicity in human rights abuses.

Labor practices

- 3 – Uphold freedom of association and right to collective bargaining.
- 4 – Eliminate forced and compulsory labor.
- 5 – Abolish child labor.
- 6 – Eliminate discrimination in employment and occupation.

Environment

- 7 – Support a cautionary approach to environmental challenges.
- 8 – Promote greater environmental responsibility.
- 9 – Encourage the development and diffusion of environmentally friendly technologies.

Anti-corruption

- 10 – Work against corruption in all of its forms including extortion and bribery.

Source: *United Nations Global Compact Brochure: Corporate Sustainability in the World Economy*, February 2011

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## **Global Citizenship**

### ***United Nations Global Compact***

The United Nations (UN) Global Compact is a strategic policy initiative for businesses interested in social justice and sustainable development. Sustainable development balances current resource consumption without compromising the well-being of future generations. Let's look at some of the important aspects of the Compact and its implications for manufacturing and service industry firms. It can be downloaded at [www.unglobalcompact.org/docs/news\\_events/8.1/GC\\_brochure\\_FINAL.pdf](http://www.unglobalcompact.org/docs/news_events/8.1/GC_brochure_FINAL.pdf).

### **Voluntary**

Membership in the Global Compact is voluntary. Through the influence of the UN and large global corporations, there are more than 8,000 corporate participants in the program. Membership requires the signature of a company's chief executive and the endorsement of its highest-level governance body.

### **Alignment with Global Compact principles**

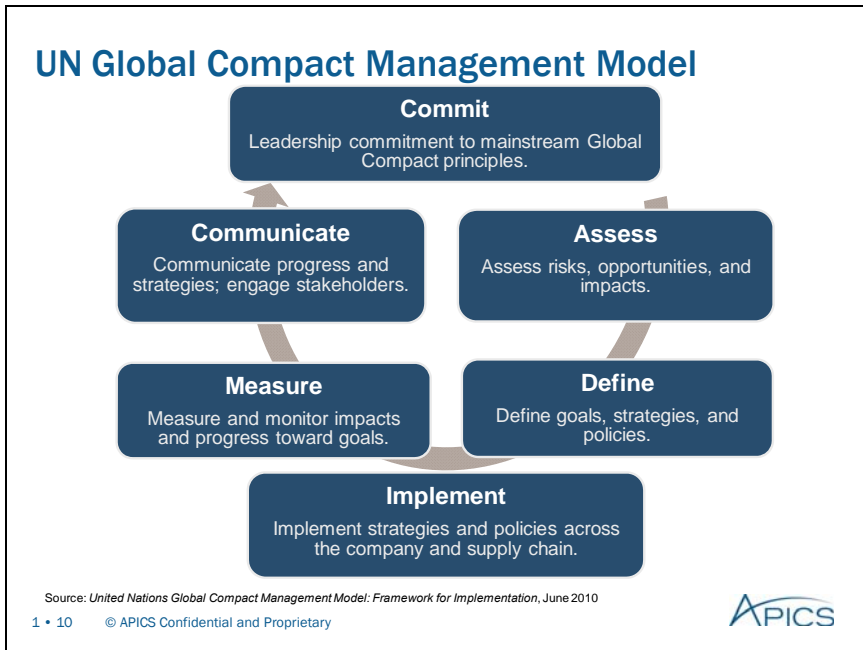
Member companies agree to align their operations with ten key principles in four areas as shown in the visual: human rights, labor practices, environment, and anti-corruption. Note that environmental concerns make up only one of the four areas.

### **Adoption of the UN Global Compact Management Model**

Of particular relevance to manufacturers and service firms with supply chain issues is the UN Global Compact Management Model, which we will discuss shortly. The management model provides detailed guidelines for incorporating the ten principles in business strategies and operations.

### ***Ten Principles***

Visual 1-9 shows how the ten universally accepted Global Compact principles have been organized into the four areas mentioned above.



**Global Citizenship (cont.)**

**UN Global Compact Management Model**

For global manufacturing and service companies, the UN Global Compact Management Model provides guidance for developing a corporate sustainability strategy consistent with the ten human rights, labor, environment, and anti-corruption principles. The assumption is that companies incorporating sustainability principles into their operations and culture are better able to widen their view of risk and opportunity and increase long-term value creation.

The UN Global Management Model shown in the visual has the look and feel of a corporate performance improvement method used by manufacturing and service industry firms. Shown in the diagram below are descriptions of the six steps of the model. It can be downloaded at [www.unglobalcompact.org/docs/news\\_events/9.1\\_news\\_archives/2010\\_06\\_17/UN\\_Global\\_Compact\\_Management\\_Model.pdf](http://www.unglobalcompact.org/docs/news_events/9.1_news_archives/2010_06_17/UN_Global_Compact_Management_Model.pdf).

Model step	Description
Commit	Company leadership publicly signals its commitment to stakeholders. Leadership commits to supporting the Global Compact and making the ten principles part of the strategy, culture, day-to-day operations, and oversight provided by transparent governance structures.
Assess	The company assesses its risks and opportunities in financial and extra-financial terms, as well as the impact of its operations and activities on the issue areas, on an ongoing basis in order to develop and refine its goals, strategies, and policies.
Define	Based on its assessment of risks, opportunities, and impacts, the company develops and refines goals and metrics specific to its operating context and creates a roadmap to carry out its program.
Implement	The company establishes and ensures ongoing adjustments to core processes, engages and educates employees, builds capacity and resources, and works with supply chain partners to address and implement its strategy.
Measure	The organization adjusts its performance management systems to capture, analyze, and monitor the performance metrics established in the "Assess" and "Define" steps listed above; monitors performance against goals; and makes adjustments to improve performance.
Communicate	The company communicates its progress and forward-looking strategies for implementing its commitment by developing a communication on progress, and engages with stakeholders to identify ways to continuously improve performance.

Why does the UN Global Compact single out supply chain partners as an important factor in a firm's ability to comply with its ten principles?

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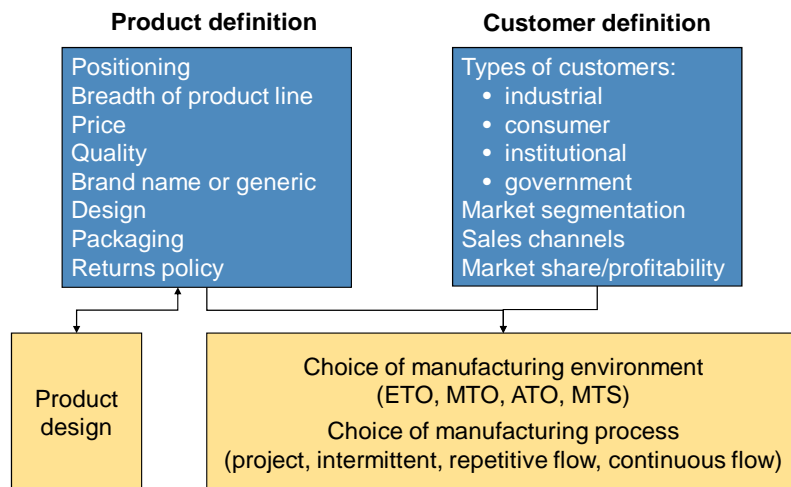
## Manufacturing Business Model

- Defining products and customers
- Designing products and processes
- Managing material flow
- Providing customer service and support

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## Customers and Products



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**Manufacturing Business Model**

A manufacturing company's business model includes how it defines its products and customers, or markets; designs products and services; manages material flows; and provides customer service and support—all of which support the company's goal of making a profit and competing effectively in the marketplace over time.

**Defining Products and Customers**

Establishing what you are going to sell and who you are going to sell it to is one of the most fundamental decisions for a manufacturer. These two issues are closely related.

There are many decisions to be made in defining products. These include

- ◆ product positioning (quality versus price)
- ◆ breadth of product line
- ◆ price
- ◆ quality
- ◆ brand name or generic
- ◆ design
- ◆ packaging
- ◆ returns allowed.

Similarly, there are many decisions to be made in defining customers, or markets:

- ◆ type of customers; for example, industrial, consumer, institutional, and government
- ◆ market segments
- ◆ sales and distribution channels
- ◆ market share and profitability

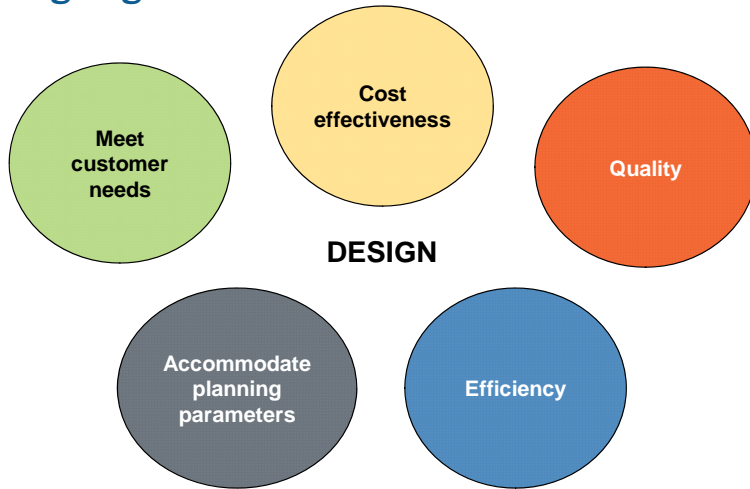
The definition of products and customers will have a major influence on production decisions, such as

- ◆ choice of manufacturing environment—make-to-order (MTO), make-to-stock (MTS), assemble-to-order (ATO), or engineer-to-order (ETO)
- ◆ choice of manufacturing process—project, intermittent, or repetitive, flow or continuous flow.

In addition, product definition influences and in turn is influenced by product design.



## Designing Products and Processes



**Designing Products and Processes**

The downstream success of a product starts when the products and processes are first being defined and designed. The design affects not only the product, but also the downstream planning system parameters, manufacturing processes, ongoing support, and return on investment.

The product and supporting processes should be designed to

- ◆ meet customer needs and provide value. Techniques, such as quality function deployment, which we will review in Session 9, can be used to determine technical requirements based on customer input, or the *voice of the customer*. Meeting the customer's needs is the most important characteristic for a manufactured product. Concepts such as participative design/engineering, simultaneous engineering, and concurrent engineering may be used to enhance the design with input from key stakeholders.
- ◆ be cost effective. Both fixed and variable costs will have a major influence on sales price and subsequent profit. If manufacturing costs are too high to achieve acceptable profit, decisions on whether to (1) make or buy the product or (2) put cost-reduction methods into place must be made.
- ◆ provide quality. Customers today expect high-quality products and often are willing to pay more for quality. Quality considerations start when designing the product. What materials will be used? How will the product be assembled? What level of control can be achieved?
- ◆ be built or provided efficiently. Efficiency reduces costs, eliminates wasteful activities, and leads to better customer satisfaction through on-time production and deliveries.
- ◆ accommodate planning parameters. Planning parameters need to be taken into account in the design of products and processes. These include cumulative lead time, order quantity modifiers such as scrap and testing requirements, safety stock or buffers, and capacity.

Give an example of a product that you have encountered that was *not* designed with these considerations. Were you satisfied with the product? Why or why not?

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**Project Management**

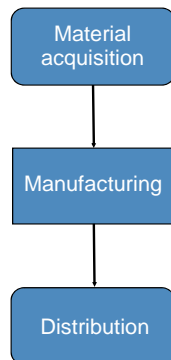
Designing products and processes can be coordinated as projects if the endeavor has a specific objective to be met within predetermined time and dollar limitations. Project management coordinates the organizing, planning, scheduling, directing, controlling, and monitoring of project activities to ensure that project objectives are met.

Give an example, if you can, of a product or process that was designed using project management. How did project management impact its success?

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## Managing Material Flow



### **Managing Material Flow**

- ◆ Acquisition—Planning the acquisition and use of production resources to meet demand through demand management, materials planning, and procurement
- ◆ Manufacturing operations
  - ◆ Scheduling—Schedule production operations as close to when customers need products as possible; this reduces unnecessary inventory or lost sales.
  - ◆ Production—Execute production operations efficiently; this reduces waste of materials or time.
- ◆ Distribution—Manage the flow of materials to and from customers. With reverse logistics, products may be returned from customers to suppliers for the purpose of repair, recycling, or remanufacturing. With green reverse logistics, for example, the manufacturer takes back products or packaging for reuse or disposal in an environmentally sensitive way. Products may be remanufactured through refurbishment to a like-new condition. Remanufacturing is a green concept because it requires fewer resources to refurbish the product than to manufacture it from raw materials.

## Providing Customer Service and Support

- Understanding and meeting customer wants and needs
- Two-way communication
- Working with customers to solve problems

### ***Providing Customer Service and Support***

Customer service and product support are keys to customer retention and loyalty. We likely all know of someone who has said “I’ll never buy that again” after receiving poor service. Some companies make customer service a strategic goal and set high performance measures to ensure that customers are satisfied.

Customer service includes

- ◆ understanding and meeting customer needs
- ◆ two-way communication with customers
- ◆ working with customers to solve design and production problems.

The concept of customer relationship management (CRM), which is a philosophy based on putting the customer first, will be reviewed later in this course. CRM involves the collection and analysis of information to support customers. It also includes account management and order management.

## Global Environment



- Global competition
- Economic, government, and regulatory influences
- Customer expectations
- Corporate social responsibility

### **Business Environment**

Also called the operating environment, the business environment consists of numerous external factors that influence how a company develops their manufacturing environments and production process choices. These factors include global competition; economic, government, and regulatory influences; customer expectations; and corporate social responsibility.

### **Global Competition**

Businesses have to compete with companies from all over the world. Many companies now have global markets.

Give an example of an organization that has a global presence. How does this organization differentiate its product and services from its competition?

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### **Economic, Government, and Regulatory Influences**

The world economy affects the global supply chain—from availability of resources to consumer sales. Similarly, governments and regulatory agencies can enact rules and regulations that influence the global supply chain in many ways.

Why do you think that the global economy affects products you buy locally?

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## Customer Expectations

Characteristics that provide value to the customer:

- Cost (price)
- Quality
- Speed (order lead time)
- Dependability
- Flexibility (product and volume)

## Corporate Social Responsibility and Sustainability

**Corporate social responsibility**



**Sustainability**

Responsible economic growth that benefits all segments of society in an equitable manner

**Customer Expectations**

In one sense, the customer does not buy a product or service, but a solution to a problem or a need. Demand usually is market driven and the supplier must determine characteristics that provide value to the customer and fulfill the customer's needs, such as the following:

- ◆ cost, or price
- ◆ quality
- ◆ speed, in terms of order lead time
- ◆ dependability, or pre- and post-sales service
- ◆ flexibility, in terms of product and volume

What are some other characteristics that provide value to the customer?

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**Corporate Social Responsibility and Sustainability**

The UN Global Compact, another example of the external business environment's influence, was discussed earlier in this session. There is growing international consensus for businesses and their supply chains to exercise corporate social responsibility in the areas of

- ◆ human rights
- ◆ labor practices
- ◆ environment
- ◆ anti-corruption.

Sustainability in the context of corporate social responsibility relates not only to the responsible use of material resources and the minimizing of environmental impacts. It also relates to social behavior—human rights, labor practices, and anti-corruption initiatives—that promotes responsible economic growth to equally benefit all segments of society.