Why is Manufacturing Important?

James S.K. Ang
Department of Decision Sciences, NUS
Three-Sector Hypothesis

- Primary (Agriculture)
- Secondary (Manufacturing)
- Tertiary (Service)

According to the hypothesis by Colin Clark and Jean Fourastié, the main focus of an economy's activity shifts from the primary, through the secondary and finally to the tertiary sector.
Trends in U.S. Employment by Sector

![Graph showing trends in U.S. employment by sector from 1850 to 2000. The graph illustrates the proportion of total employment in service, manufacturing, and agriculture over time.]

Some comments and rationales

Let us look at manufacturing and service in this presentation.

● Emerging countries usually focus on manufacturing to provide jobs.

● Singapore is a good case in point

● Singapore --- a third world country in the 1960s. The infrastructure was poor, and there was insufficient domestic capital with little or no foreign investment.

● In the 1960s, many companies were producing garments, textiles, toys, wood products and hair wigs
Some comments and rationales

- Objective – to create jobs for the people.
- New labour laws were passed to curb industrial disputes and to attract foreign investors. Concept of pioneer status – no corporate taxes and so on.
- Labour unions, for example, could only go on strike under “strict” conditions. Strikes would deter foreign investments.
Some comments and rationales

● The main objective of the Government was therefore to create jobs by intensive industrialization.

● The Singapore Economic Development Board (EDB) was set up in August 1961 to launch an investment program to bring in labor intensive industries. Efforts intensified.
Moving up the value chain

• 1970s: capital- and skill-intensive industries

• In the late 1970s, the problem of unemployment in Singapore had been largely resolved. The government went on to assist industries to build up their technological capabilities as Singapore continued in the expansion of its industrial base.

• Start of high tech – computer parts, computer peripherals, silicon wafers. MNCss began to embark on R and D.
Moving up the value chain

● **1980s: technology-intensive industries.**

● Moving into knowledge-intensive activities such as R&D and computer software services, EDB co-established institutions of technology with Japan, Germany and France that trained Singaporeans for specialised jobs in the high-technology fields of electronics and engineering.
Moving up the value chain

● The 1990s: Emphasis on technology, manufacturing and investment

● Even as companies intensified their use of technology to move up the value chain, manufacturing remained important in Singapore’s economic development. EDB strengthened its focus on key industries, namely chemicals, electronics and engineering.

● Consequently, Singapore also began to develop a biomedical science industry that included the pharmaceutical, biotechnology and medical technology sectors.
Moving up the value chain

● The 2000s: A focus on innovation, knowledge, and R&D

● Manufacturing and financial business services accounted for 26% and 22%, respectively, of Singapore's GDP in 2000.

● Others – utilities, construction, commerce, transportation and communications; other services (make up the rest).

● The electronics industry leads Singapore's manufacturing sector -- 48% of total industrial output, but the government also is prioritising development of the chemicals and biotechnology industries.
From Manufacturing to Service

- **Service economy** can refer to one or both of two recent economic developments:

- The increased importance of the **service sector** in **industrialized economies**. The current list of **Fortune 500** companies contains more service companies and fewer manufacturers than in previous decades.
From Manufacturing to Service

- The service economy in developing countries is mostly concentrated in financial services, hospitality, retail, health, human services, information technology and education.
- Products today have a higher service component than in previous decades. In the management literature this is referred to as the servitization of products. Virtually every product today has a service component to it.
From Manufacturing to Service

• The old dichotomy between product and service has been replaced by a service-product continuum. Many products are being transformed into services.

• For example, IBM treats its business as a service business. Although it still manufactures computers, it sees the physical goods as a small part of the "business solutions" industry. They have found that the price elasticity of demand for "business solutions" is much less than for hardware.
Why is manufacturing important?

● Manufacturing has been the path to development. Strategic achievement of rich nations over the last several hundred years to create a high-quality manufacturing sector in order to develop national wealth and power.

England, the USA, Germany, Japan, Korea, Taiwan and China.
Why is manufacturing important?

- Manufacturing is the foundation of global “Great Power”

The most powerful nations in the world—those that control the bulk of the global production of manufacturing technology. Not enough simply to have factories and produce more goods. Have to have to know how to make the machinery that makes the goods. The key to power, then, is to make the “means of production.”
Why is manufacturing important?

- Manufacturing is the most important cause of economic growth

Growth of manufacturing machinery output and technological improvements – main drivers of economic growth. No machinery industries – no sustained economic growth. IPhones, Internet and many related products are based on semiconductors equipment, which depend on precision engineering and machine tools.
Why is manufacturing important?

- **Services are dependent on manufactured goods**
  -- Global trade is based on goods, not services
  80 percent of world trade – merchandise trade – only 20 percent service.
  -- Services are mostly acts of using manufactured goods – retail, wholesale, marketing (about 11 percent of the US economy). Real estate – act of buying and selling a “real” or “physical” asset. Healthcare – act of using medical equipment and drugs.
  -- Finance – also dependent on manufacturing – loans and letters of credit
A Bundle of Products and Services

When you purchase a notebook PC, you may purchase/use some services as well. For example,

• After-sales service (e.g., extended warranty, help desk)
• Transportation service (e.g., delivery, taxi)
• Financial service (e.g., credit cards, loan)
• Internet service (e.g., Internet service provider, broadband service provider)
• Training program (e.g., user's guide, DVD instruction)
• Software (e.g., utility, game)
The Service Package

The service package is defined as a bundle of goods and services that is provided in some environment. The bundle consists of the following five features:

- **Supporting Facility**: The physical resources that must be in place before a service can be sold.
  - Examples are golf course, ski lift, hospital, airplane, etc.

- **Facilitating Goods**: The material consumed by the buyer or items provided by the consumer.
  - Examples are food items, legal documents, golf clubs, medical history.

- **Information**: Operations data or information that is provided by the customer to enable efficient and customized service.
  - Examples are patient medical records, seats available on a flight, customer preferences, location of customer to dispatch a taxi.

- **Explicit Services**: Benefits readily observable by the senses. The essential or intrinsic features.
  - Examples are quality of meal, attitude of the waiter, on-time departure.

- **Implicit Services**: Psychological benefits or extrinsic features which the consumer may sense only vaguely.
  - Examples are privacy of loan office, security of a well-lighted parking lot.
Some comments on HPM

• In the 1980s, Japanese companies in the States were doing very well.

• The objective of the HPM project was to understand why the Japanese companies were doing so well. The average American companies could not match them.
Some comments on HPM

• Roger Schroder believed that the best American companies could match the Japanese companies. The average one could not.

• But Roger Schroder believed that the best American companies could match the Japanese companies. To test this, a group of researchers led by Roger Schroder started round one of HPM. It was called World Class Manufacturing then.
Some comments on HPM

• The project sought to investigate the methods and practices used by those high performing plants (both Japanese and American) in order to understand how they could achieve that superior performance.

• Soon researchers in other countries expressed interest. That led to round 2. Questionnaires used in round one were substantially revised and improved.
Some comments on HPM

• The objective --- to articulate the practices associated with high performance manufacturing and their interrelationships. Practices on JIT, TQM, HRM, Proactive IT and others were examined.

• The way linkages were done and implemented is what that leads to high performance manufacturing.

• Each firm is different and each must forge its own linkages in order to perform at a high level. For example, how JIT is linked to IT is crucial to the firm.