

Reshoring U.S. Manufacturing

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Overview

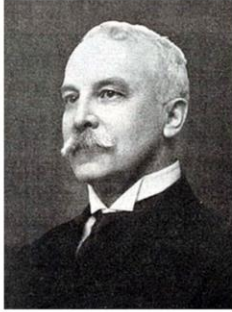
1. Manufacturing is the foundation of national prosperity and also military power.
 - A decline in manufacturing capability is a ***universal leading indicator of a decline in national well-being and affluence.***
 - It is a bad idea to cede this power to Mainland China, an unreliable supplier and a dangerous geopolitical rival.
 - A manufacturing resurgence is the **only** way to reverse the Federal deficit.
2. Eliminate the paradigm that cheap labor is really cheap, and we have a compelling argument for reshoring.
3. The good news is that proven, off-the-shelf solutions to the challenge of cheap offshore labor have been available for more than 100 years.

Manufacturing is All-Important (1)

- Manufacturing is the backbone of national affluence and military power.
- Absence or decline in manufacturing capability has been a leading indicator of national decline. *There have been no exceptions.*
 - Polish-Lithuanian Commonwealth (16th Century)
 - Spanish and Portuguese Empires (16th Century)
 - War of Independence
 - American Civil War (Northern manufacturing dominance)
 - First World War (US manufacturing dominance)
 - Second World War (US manufacturing dominance)

Poland was among the most powerful countries on earth but, even as long ago as the 1500s, it lagged other countries in actual manufacturing capability.

Manufacturing is All-Important (2)



- Harrington Emerson wrote in 1911 that the United States was essentially trading natural resources for manufactured goods. "...we childishly squander our national resources in exchange for perishable luxuries supplied us by older and wiser men, corporations, and nations, who, not having gifts and prodigal equipment, still use their brains and hands—men who trade us sunshine, water, and air for our mined wealth, for our soil's fertility."

Harrington Emerson portrait from 1911, public domain due to age.

Emerson, Harrington. 1911. *The Twelve Principles of Efficiency*, public domain due to age France and Germany, for example, transformed sunshine, water, and air into fermented beverages.

Manufacturing is All-Important (3)



Suppose you are a Spanish or Portuguese Conquistador and you discover the legendary El Dorado, the City of Gold in the New World.

Limitless wealth or deadly poison to your economy?

Department of the Treasury. Bureau of the Mint. U.S. Mint, San Francisco, California (public domain). Photograph of a vault full of gold bars (colorized).

Alfred Thayer Mahan's *The Influence of Sea Power Upon History* shows why this "wealth" was a total illusion. "When to these qualities are added the advantages of Spain's position and well-situated ports, the fact that she was first to occupy large and rich portions of the new worlds and long remained without a competitor, and that for a hundred years after the discovery of America she was the leading State in Europe, she might have been expected to take the foremost place among the sea powers. Exactly the contrary was the result, as all know."

"The mines of Brazil were the ruin of Portugal, as those of Mexico and Peru had been of Spain; **all manufactures fell into insane contempt**; ere long the English supplied the Portuguese not only with clothes, but with all merchandise, all commodities, even to salt-fish and grain. After their gold, the Portuguese abandoned their very soil; the vineyards of Oporto were finally bought by the English with Brazilian gold, which had only passed through Portugal to be spread throughout England."

Alfred Thayer Mahan, *The Influence of Sea Power Upon History*
<http://www.gutenberg.org/files/13529/13529-h/13529-h.htm> (public domain due to age)

The treasure encouraged Spain and Portugal to offshore manufacturing to England and the Netherlands.

Manufacturing is All-Important (4)

How most of the world abolished slavery without fighting civil wars:



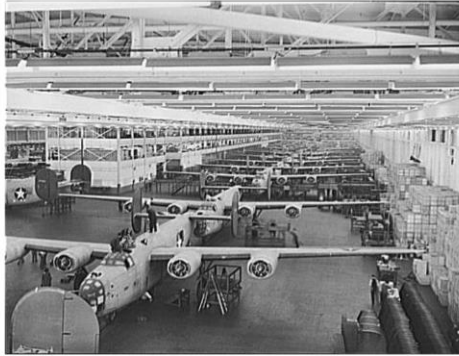
Aristotle (right) predicted that industrialization and automation would abolish slavery. "For if every instrument could accomplish its own work, obeying or anticipating the will of others, ...if, in like manner, the shuttle would weave and the plectrum touch the lyre without a hand to guide them, **chief workmen would not want servants, nor masters slaves.**" Or, by implication, **low-wage labor.**

Picture from Raphael, "School of Athens," public domain due to age.

Aristotle (<http://classics.mit.edu/Aristotle/politics.1.one.html>) cites as examples the tripods of the god Hephaestus, and statues invented by the engineer Daedalus, that acted of their own accord. The Greeks also said that Hephaestus created two mechanical men, who were very similar to robots in 20th century science fiction movies. Greek myths (or science fiction stories) therefore featured what we would now call robots, or intelligent machines. While the Greeks' ability to build such machines was limited by the contemporary technology, those like Aristotle could foresee the socioeconomic implications of their future development.

Greek mythology also featured the world's first "battle mech," the bronze giant Talos whose most famous incarnation is probably Ray Harryhausen's model in *Jason and the Argonauts* (1963).

Manufacturing is All-Important (5)



Admiral Yamamoto (paraphrased): "Don't start a war with people whose factories look like this." The problem is that Mainland China's factories now look like this.

Yamamoto portrait: "As an official portrait commissioned by the Imperial government of Japan, this portrait became public domain on 1973."

Willow Run bomber factory: public domain as a work by a U.S. Government employee. Ford's Willow Run bomber factory could make one B-24 per hour.

Henry Ford's industries made the United States the wealthiest and most powerful nation on earth, and created the American middle class with an unprecedented hourly wage of \$5 a day. Ford achieved this with **manufacturing methods that were cited explicitly as countermeasures against cheap offshore labor.**

The PRC is a Dangerous Rival (1)

- Recent conduct by the People's Republic of China (PRC) underscores its status as a dangerous geopolitical rival.
 - PRC aircraft and ships have played "chicken" with US aircraft and ships in international territory.
 - The PRC has threatened to attack Taiwan, Japan, the Philippines, Australia, and the United States.
 - Two men were arrested for operating a Communist Chinese police station in the United States.
- The PRC threatened previously to cut off vital medications needed to treat Covid-19, and thus intentionally cause the deaths of countless Americans.
 - Why are we dependent on this country for vital medications to begin with?

<https://www.justice.gov/opa/pr/two-arrested-operating-illegal-overseas-police-station-chinese-government> "As alleged in the complaint, Lu and Chen are charged with conspiring to act as agents of the PRC government as well as obstructing justice by destroying evidence of their communications with an MPS official. The defendants worked together to establish the first overseas police station in the United States on behalf of the Fuzhou branch of the MPS." MPS = Ministry of Public Security "It is simply outrageous that China's Ministry of Public Security thinks it can get away with establishing a secret, illegal police station on U.S. soil to aid its efforts to export repression and subvert our rule of law," said Acting Assistant Director Kurt Ronnow of the FBI Counterintelligence Division."

<https://www.independent.co.uk/news/world/americas/us-politics/coronavirus-china-us-drugs-trump-rubio-china-virus-xinhua-hell-epidemic-a9400811.html> "If China retaliates against the United States at this time, in addition to announcing a travel ban on the United States, it will also announce strategic control over medical products and ban exports to the United States. Then the United States will be caught in the ocean of new coronaviruses," the article said. "Also according to the US CDC officials, most of the drugs in the United States are imported...If China banned exports, the United States will fall into the hell of a new coronavirus pneumonia epidemic."

The PRC is a Dangerous Rival (2)

- The PRC also has a long track record of exporting counterfeit and substandard products to the United States and other countries. These include:
 - Counterfeit N-95 respirators for Covid-19 protection
 - Counterfeit semiconductor devices
 - Contaminated heparin that caused patient deaths
 - Counterfeit and substandard active pharmaceutical intermediates (APIs)
 - Melamine-contaminated food for humans and pets
 - Counterfeit fasteners

The PRC is a Dangerous Rival (3)

- The United States won the Second World War with a manufacturing base that outproduced all the other belligerents put together. We are however no longer up to the job of building even three destroyers a year.
- The speed at which both sides are burning through equipment and ammunition in Ukraine underscores the fact that this is obviously a very dangerous situation we need to turn around very quickly. During the Second World War, we could easily replace anything except a human life and the other side could not.

Hanson, Victor Davis. 2020. "Is America a roaring giant or crying baby?" *Chicago Tribune*, April 8. <https://www.chicagotribune.com/opinion/commentary/ct-opinion-coronavirus-america-roaring-giant-hanson-20200408-yo6i4sdaxvhqnbavnwni3p57bq-story.html> "More incredible, by the end of 1944, the American gross domestic product exceeded the economic output of all the major belligerents on both sides of World War II put together: the Soviet Union, the United Kingdom, Japan, Italy and Germany."

<https://news.usni.org/2023/03/21/osd-comptroller-says-u-s-shipyards-cant-build-3-destroyers-a-year> "OSD Comptroller Says U.S. Shipyards Can't Build 3 Destroyers a Year" By: Mallory Shelbourne March 21, 2023

There is a story to the effect that, during the Battle of the Bulge, the Germans captured an American supply truck that contained, among other things, a chocolate cake. A German commander observed that his side would lose the war because the Americans could in fact deliver luxuries like chocolate cakes along with regular rations, equipment, and ammunition.

The PRC is a Dangerous Rival (4)

- Even reputable offshore suppliers are subject to involuntary disruptions.
 - "Japan Quake Knocked Out 25% Of Global Silicon Wafer Production"
 - "The global supply chain: So very fragile"
 - APICS (2011): **85% of companies reported supply chain disruption in a single year.**
 - Sumitomo: 1993 fire put more than half the world's supply of a critical epoxy resin for semiconductor encapsulation at risk.
- IATF 16949:2016 clause 6.1.2.3 (c), Contingency plans, requires planning for continuity of supply in the event of force majeure such as natural disasters or labor shortages.
- Next: **we must produce our way out of the deficit.**

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Eric Savitz, "Japan Quake Knocked Out 25% Of Global Silicon Wafer Production" 3/21/11 Forbes <http://www.forbes.com/sites/ericsavitz/2011/03/21/japan-quake-knocked-out-25-of-global-silicon-wafer-production/>

Bill Powell, "The global supply chain: So very fragile" 12/12/11 Fortune <http://fortune.com/2011/12/12/the-global-supply-chain-so-very-fragile/> E.g. autoworkers in Ohio had their hours cut because Honda could not get parts from Thailand

"Majority of Businesses Experienced Supply Chain Failure" By APICS Staff December 06, 2011 <http://www.apics.org/news-landing-page/2012/01/20/majority-of-businesses-experienced-supply-chain-failure>

Sumitomo reference http://articles.latimes.com/1993-12-01/business/fi-62629_1_semiconductor-industry-assn

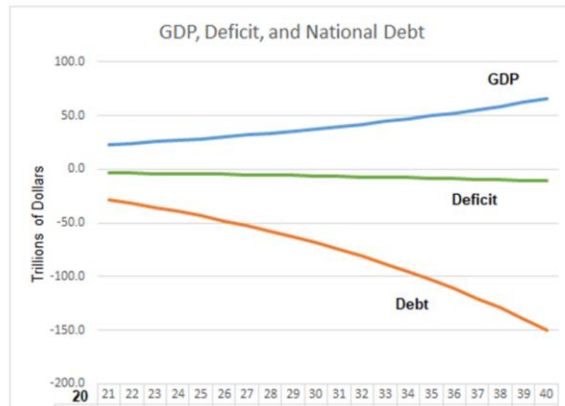
All of these examples are strong arguments for a voluntary "ISO 9001:2015 Plus" in which one's own procedures go beyond the standard's explicit requirements to consider risks of this nature.

We Must Produce Our Way Out of the Deficit (1)

- The current Federal debt (June 2023) is \$31.5 trillion or close to \$100,000 for every American including children and retirees.
- While interest on this debt was once very low, Treasury securities now pay 5 percent or even more.

We Must Produce Our Way Out of the Deficit (2)

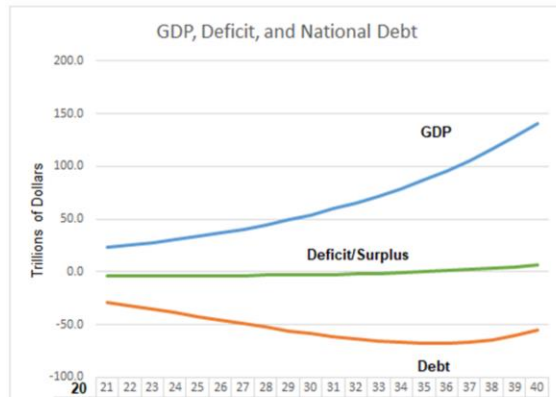
Assumptions:
Interest 5.0%
Spending growth 5.0%
GDP growth 5.7%
Tax fraction of GDP, 17.6%



The Gross Domestic Product (GDP) was \$23 trillion for 2021, and the GDP growth rate was 5.7%. The government collected \$4 trillion in taxes on \$23 trillion which comes to 17.6% of GDP. The GDP growth rate was roughly 5.7% in 2021.

We Must Produce Our Way Out of the Deficit (3)

Assumptions:
Interest 5.0%
Spending growth 5.0%
GDP growth 10.0%
Tax fraction of GDP, 17.6%



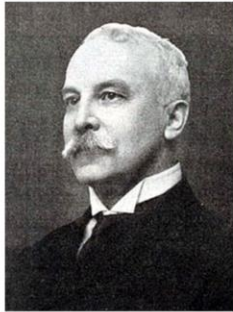
We Must Produce Our Way Out of the Deficit (4)

- ***GDP growth due to wage and price pressures is inflationary. GDP growth due to an increase in goods and services is not.***
 - We are however not going to produce our way out of the deficit by offshoring manufacturing to the PRC and spending money, often borrowed money, to buy shoddy goods made by cheap labor.
- **Next: the answer to cheap labor**

The Answer to Cheap Labor (1)

- The first step to reshoring is to get rid of the dysfunctional paradigm that cheap labor, whether offshore or domestic, reduces costs.
- Cheap labor gives massive inefficiencies a place to hide because there is no real incentive to do anything about them.
- Cheap labor was obsolete more than 100 years ago for the same reason slavery was obsolete by the mid-nineteenth century. **When a job becomes sufficiently efficient, the worker's pay is largely irrelevant.**

The Answer to Cheap Labor (2)



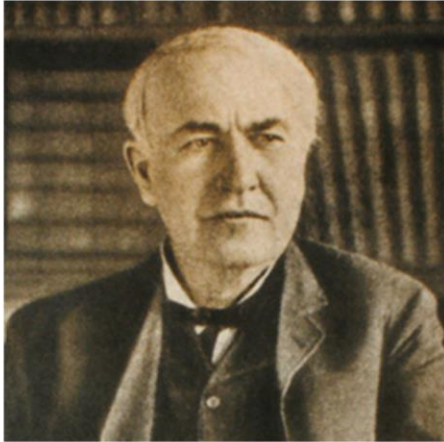
"...we violently resist a demand for a 10 per cent increase in wages, but we tolerate a 50 per cent inefficiency in the worker."

These inefficiencies can be 90 percent or more in some cases. Henry Ford estimated 95 percent in agriculture, and inspection of some farm jobs today suggest he was right.

Harrington Emerson portrait from 1911, public domain due to age.

Emerson added, "It is not the flesh and blood and brains of the Japanese that make them industrially dangerous; it is not their money, for they are poor, not their equipment, for they have but little, not their material resources, because they are meagre. **They are dangerous as industrial competitors because we are dragging along under a type of organization that makes high efficiency [im]possible and they are not; because we have not even awakened and they have to the fact that principles applied by mediocre men are more powerful for good than the spasmodic floundering of unusually great men.**"

The Answer to Cheap Labor (3)



Thomas Edison asked himself during an interview what workers would do once machines did everything—the same scenario once addressed by Aristotle.

"Manufacturers can then afford to pay any kind of wages."

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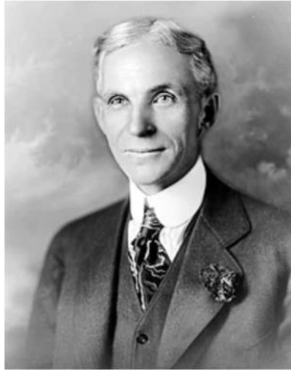
Benson, Allan L. 1923. *The New Henry Ford*. New York: Funk and Wagnalls p. 256

Photo of Thomas Edison from 1915, public domain due to age

The Answer to Cheap Labor (4)

- Cheap labor does not, contrary to popular belief, symbolize low prices and high profits. **Cheap labor is symptomatic of excessively high prices and also low profits because it gives inefficiency a place to hide.**
 - Frank Gilbreth's non-stooping scaffold proved that brick laying, as practiced for centuries if not thousands of years, wasted 64 percent of the mason's labor on bending over to pick up bricks. Many modern jobs are similarly wasteful of labor.

The Answer to Cheap Labor (5)



"Cutting wages is the easiest and most slovenly way to handle the situation, not to speak of its being an inhuman way. It is, in effect, throwing upon labour the incompetency of the managers of the business. If we only knew it, every depression is a challenge to every manufacturer to put more brains into his business--**to overcome by management what other people try to overcome by wage reduction.**"

Remember that Henry Ford didn't just say this, he made it work in all of his industries.

Henry Ford portrait, 1919 (public domain due to age)

Ford and Crowther, 1922. *My Life and Work*.

The Answer to Cheap Labor (6)



Frederick Winslow Taylor: "...the one element more than any other which differentiates civilized from uncivilized countries—prosperous from poverty—stricken peoples—is that **the average man in the one is five or six times as productive as the other.**"

Principles of Scientific Management (1911)

1. Frank Gilbreth proved that a badly designed job (brick laying) can waste 64% of a worker's labor.
2. Low-wage labor, whether domestic or offshore, gives the waste a place to hide.

Taiichi Ohno, the father of the Toyota production system, noted in 1937 that one American worker was as productive as three Germans, and one German was as productive as three Japanese.

The Answer to Cheap Labor (7)

- Understand **total cost of ownership (TCO)**. The offered price, e.g. of cheap goods from Mainland China, may reflect cheap labor. It does not reflect:
 - Transportation cost (non-value-adding)
 - Lead time (non-value-adding)
 - Waiting time, e.g. in warehouses or on container ships waiting for truck transportation
 - Batch shipments, incompatible with just-in-time
 - Poor quality, for which inventory is an excellent hiding place

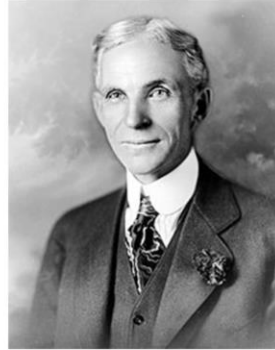
Next: opportunity costs can exceed inefficiency costs

Harry Moser has some excellent material on total cost of ownership. As but one example, <https://www.amtonline.org/article/moser-on-manufacturing-part-2>

Opportunity Costs (1)

"If a device would save in time just 10 per cent. or increase results 10 per cent., then its absence is always a 10 per cent. tax."

Opportunity cost = unrealized revenue or savings from what we fail to do. In this case, the opportunity cost is 10 percent.



Ford, Henry, and Crowther, Samuel. 1922. *My Life and Work*. New York: Doubleday, Page & Company

Opportunity Costs (2)

- "44% of U.S. workers are employed in low-wage jobs that pay median annual wages of \$18,000," which comes to roughly \$9 an hour. (2019)
- The video that goes with the article shows a worker **using a mop** to clean the floor of a large warehouse or factory.
 - The worker gets poor wages, and the employer is meanwhile paying a lot more than it should to clean its floors.
- One worker with a \$10,000 machine can do as much work as twelve workers with mops, and receive higher wages for doing it.

Picchi, Aimee. "Almost half of all Americans work in low-wage jobs." CBS News, December 2, 2019.

<https://www.cbsnews.com/news/minimum-wage-2019-almost-half-of-all-americans-work-in-low-wage-jobs/>

Opportunity Costs (3)

- This example (and the subsequent ones) underscore the key takeaway that **an opportunity cost is not the cost of what we do wrong, but the cost of what we fail to do right.**
 - The cost of what we do wrong, such as rework or scrap due to poor quality, appears in the cost accounting system.
 - **Opportunity costs are invisible to the cost accounting system** because "money we didn't make" as opposed to "money we lost" is not deductible on an income statement or tax return.
 - **Cheap labor gives opportunity costs ample places to hide.** As an example, people still pick cotton by hand in Uzbekistan even though machinery has been available for decades.

Opportunity Costs (4)

- Student Action with Farmworkers (SAF): sweet potato harvesters get paid 40 cents per bucket, or \$25 per ton.
 - A YouTube video of sweet potato harvesting shows men **bending over** to pick up the sweet potatoes, which they put into buckets they **carry** to a nearby farm vehicle.
 - Henry Ford wrote that no job should ever require anybody to bend over or take more than one step in any direction. People cannot be paid to do toe touches, or to walk.

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<https://saf-unite.org/content/facts-about-north-carolina-farmworkers> The site adds that 85% of our fruits and vegetables are picked by hand, and also that farm workers can be paid less than the minimum wage (e.g. \$5.50 an hour = \$11,000 a year).

"Harvesting Sweet Potatoes in Clayton, NC" <https://youtu.be/6XTtMc7i8r4> The narrator adds that it is "backbreaking, hard work." We already know from the Gilbreth brick laying example what is wrong with bending over.

Opportunity Costs (5)

- Various sweet potato harvesting machines are available.
 - Some are fully automated and can be operated by a single driver. The median wage for an agricultural equipment operator was \$17.48 an hour in 2021, versus sub-minimum wages for people doing the job by hand.
 - Others require manual labor and sorting but the workers ride on the machine rather than walking.
- The **opportunity cost** of not using a machine is reflected in low wages for the workers, high prices for the buyers, and mediocre profits for the employer.

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<https://youtu.be/MKsyJ0deXJ4> for a Lockwood sweet potato harvester in action

<https://www.bls.gov/oes/current/oes452091.htm>

Opportunity Costs (6)

- Strawberry picking requires (again) workers to bend over and walk. Workers may make \$10 to \$15 an hour in this manner.
 - California Rural Legal Assistance (CRLA) complains that the work is "grueling," requires "bending over," or working on hands and knees.
 - Automatic strawberry picking machines are available, and less sophisticated machines pull trailers on which the workers ride face down to easily pick the strawberries without bending over.
- **Next: We Can Do It**

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<https://strawberryplants.org/get-a-job-picking-strawberries/> "strawberry picking will generate between ten and fifteen dollars per hour, depending on the skill of the strawberry picker"

CRLA "A Bitter Harvest: Strawberry Fields" Oct 15, 2010 shows workers bending over, walking, and even carrying boxes of strawberries on their shoulders (waste motion for which they cannot be paid, and which adds to the buyer's costs).

Florida Department of Agriculture and Consumer Services video of workers bending, walking, and carrying boxes of strawberries <https://youtu.be/-53xf7jdHU>
AGROBOT Robotic Strawberry Harvester at <https://youtu.be/M3SGScaShhw>

Nashville farmers invent strawberry picking machine <https://youtu.be/epGrJYDC9OU>
The workers lie face down on a moving platform, and a canopy can be put over the platform to keep out the sun. The narrator says it doubles the production rate.

We Can Do It (1)



None of this is theory. We did it before, and we can do it again.

- (1) We did it beginning in about 1908 (the introduction of Ford's Model T)
- (2) We did it again during the Second World War.

J. Howard Miller's "We Can Do It!", the inspiration for "Rosie the Riveter" Public domain as a publication of the U.S. Government

We Can Do It (2)

- Victor Davis Hanson, 2020. "Is America a Roaring Giant or a Crying Baby?" describes the United States' reaction to the Second World War.
 - The United States was still emerging from the Great Depression in the 1930s.
 - As of 1944, the United States' gross domestic product (GDP) **exceeded that of the Axis and the other Allies put together**. While American Soldiers and Sailors could not be replaced, any material the enemy destroyed could—and very quickly.
 - **The US Navy's tonnage exceeded that of the rest of the world by 1945**. Most of the Axis' no longer counted due to being at the bottom of the ocean, but the Royal Navy's certainly did.

The Sherman Tank was, for example, no match for the German Tiger in a head-to-head confrontation but, if the Sherman's crew survived their tank's destruction, they were simply issued another. If the Tiger's crew survived their tank's destruction, they probably had to join the infantry because replacements were in short supply. The U.S. eventually deployed the mass-produced Pershing as an answer to the Tiger.

We Can Do It (3)

American history is a legacy of industrial and manufacturing innovation.



Benjamin Franklin was not only an inventor, he was the real father of lean manufacturing.

- (1) "A penny saved is a penny earned" → money saved, e.g. through the avoidance of waste, flows directly to the bottom line while, in contrast, it may be necessary to increase sales by \$10 to get \$1 in profit.
- (2) Wasted time can never be recovered; the principle behind Goldratt's Theory of Constraints.
- (3) Henry Ford cited Franklin's influence explicitly.

Franklin's *The Way to Wealth* adds, "If you would be wealthy, **think of saving as well as of getting**. The Indies have not made Spain rich, because her outgoes are greater than her incomes." Elimination of a dollar in waste is as profitable as another ten or so dollars in sales.

Benjamin Franklin by Joseph Duplessis, public domain due to age.

We Can Do It (4)

- Franklin's *The Way to Wealth* adds, "Beware of little expenses; *A small leak will sink a great ship*, as Poor Richard says and again."
 - Franklin's principle, as applied more than 100 years later in Henry Ford's factories, is that seemingly minor annoyances and inefficiencies (such as having to walk or look for tools and parts) add up to a lot of waste. **Frontline workers are in the best position to notice these wastes.**
- "Buy what thou hast no need of, and ere long thou shalt sell thy necessities."
 - Ford made it very clear that his purchasing department bought materials only as they were needed and not to get bargain discounts.

Goldratt's *The Goal* featured a warehouse with items for which the purchasing department got excellent bargains, but had not been used.

We Can Do It (5)

- Summary

1. The fundamental principles of what we now call lean manufacturing, and also the Toyota production system, **were developed in the United States and their foundation dates back to the 18th century.**
2. They were developed further in the early 20th century **as a specific response to not only cheap offshore labor, but also highly efficient offshore labor.**
3. While technology has certainly changed during the past 100 years, these principles have not. Nothing, other than the mistaken belief that "cheap labor equals low prices and high profits," prevents us from using them again.

Summary (1)

1. Manufacturing is the foundation of national prosperity, affluence, and military power. It is very poor judgment to cede manufacturing power to a dangerous geopolitical rival like the People's Republic of China.
2. The only way to get out of a deficit spending death spiral, in which interest on the national debt will exceed our ability to pay, is to increase the economic growth rate enormously.
 - Economic growth driven by higher productivity (more goods and services) is **not** inflationary.

Summary (2)

3. Cheap labor, whether domestic or foreign, is often symptomatic of overpriced goods and low profits.
 - Cheap labor, a substitute for what Henry Ford called "putting brains into the business," gives waste and inefficiency a place to hide.
4. The principle of opportunity costs cannot be overlooked.
 - These costs can be tenfold, twenty-fold, or even more but they cannot be reflected by the cost accounting system.
 - What is the opportunity cost of using manual labor to pick strawberries, or using a mop to clean a large commercial floor?
 - What is the opportunity cost of having six people (even unpaid) pick 120 kg of cotton per day when one person with a cheap handheld rechargeable electric tool can do the same job?

An Uzbek student died in 2013 while picking cotton, for which there is a mandatory 20 kg daily quota.

An Indian-made handheld rechargeable battery-powered cotton picking machine is available for 5500 rupees (about \$71.50 USD) that will pick 125 kilograms of cotton per day (as much as six people doing it by hand).

Radio Free Europe/Radio Liberty, 2013. "Uzbek Cotton-Picking Claims Eighth Victim." Oct. 2013. <https://www.rferl.org/a/25145827.html> The reference does not go into detail but this could be a form of robot, a feudal tax paid in labor rather than with money.

<https://www.indiamart.com/proddetail/cotton-picking-machine-5022844791.html>

Summary (3)

5. The United States gained manufacturing supremacy twice, and we can and must do it again.
 - Ford's industries gave us industrial supremacy by 1918.
 - American manufacturing pulled us out of the Great Depression and then defeated the Axis by 1945.
 - The same goal should be achievable by 2025 if not sooner.

Thank you for listening!

Questions and Discussion