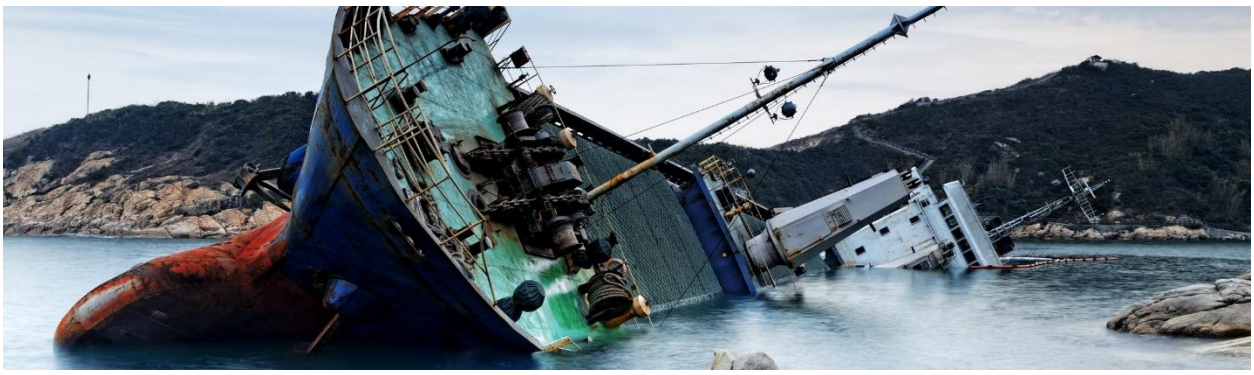
Impact of Tariffs, Demographics, and Amazon, on US Manufacturing



Abstract:

U.S. manufacturing is at a turning point. While the number of mid-sized plants has held steady at around 65,000, the business model that sustained them for decades—long-run, make-to-stock production—has been rendered obsolete by global labor shifts, trade disruptions, rising tariffs, and evolving customer expectations. Today's manufacturers must navigate a fragmented, high-cost labor market at home, reduced labor availability in China, and increased geopolitical and regulatory risk.

At the same time, opportunities exist to optimize profitability by leveraging international cost and tariff arbitrage—sourcing components from low-cost regions like India, Vietnam, and Mexico, while retaining high-value final assembly in the U.S. This white paper outlines a practical and profitable path forward using distributed supply chains and hybrid manufacturing models. It highlights the urgent need for senior leaders to invest in intelligent operations platforms like SmartOps24x7 to manage global complexity, ensure real-time visibility and control, and support strategic decision-making in an increasingly volatile manufacturing environment.

White Paper

There are about 65,000 mid-sized manufacturing plants in the continental USA. This number has not changed much over the past quarter century but the nature of US manufacturing has changed completely in this time.

At the turn of this century, most manufacturers were make-to-stock in that they made a limited range of products, in long runs. They placed these products in one or more distribution warehouses, from which they shipped these products to customers.

Each manufacturing plant in the USA was an "island" unto itself, with its own front-office-staff, IT and manufacturing engineering departments. A typical mid-sized plant employed about 100 people on the shop floor and in the warehouses and about 25 people in the front office.

Then China joined the WTO in 2001.

At that time China had a supposed 1.4 billion people, many of whom were rural and willing to migrate to China's cities to work in manufacturing plants for under $1/hour. At the same time US plants were paying production workers an average of $14.26 an hour.

With no trade barriers, there was a huge sucking sound as all long run manufacturing in the USA migrated to China to take advantage of the lower wage rates. The clear winners were the private equity financiers that gobbled up these distressed plants, laid off all their workers and outsourced the manufacturing to China. The clear losers were workers in all these US manufacturing plants.

The remaining manufacturing plants survived by offering make-to-order semi-custom products, with short delivery times, which were far shorter than the 6 weeks it took for products to transit from Shanghai to Los Angeles by boat. This only worked, however, for large or heavy products as light weight products such as electronics could be economically air freighted.

But then along came Amazon, with its promise of a delivery on a wide-range of consumer products in a few days, which quickly spread to B-to-B products. Fortunately, most US manufacturers had already shifted to make-to-order delivery of a wide-variety of semi-custom products, with short delivery times, and so were able to take advantage of this shift.

Also, US manufacturers embraced shop-floor automation, thereby substantially reducing the number of people required on the shop floor and in their associated warehouses. Unfortunately, during the decade from 2010 to 2020 we also saw a dramatic increase in Government rules and regulations, which required significant increase in front-office support personnel, despite outsourcing many, if not all, of the on-site IT support personnel for each plant.

At least the period from 2010 to 2020 was relatively stable for US manufacturers with most labor-intensive manufacturing being done in China but with final assembly and quick-turn semi-custom manufacturing being done in the USA.

But then along came Covid and its resultant disruption in the supply chain, which caused manufacturers to look at the cost of manufacturing in China, in terms of reliability as well as labor costs. What they found was labor costs had risen to over $5/hour in major Chinese cities and that fringe benefits had grown to be much more generous than in the USA.

As a result, China is no longer competitive with places like Cambodia and Indonesia, with labor costs under $1/hour and Mexico at about $2/hour. This combined with the CCP's "Wolf Warrior" aggression against the USA caused many US manufacturing organizations to shift production from China to elsewhere such as other east Asia countries and Mexico.

The Coup de Gras for Chinese manufacturing was the estimate by serious demographers that China now has a population of less than 500 million people, instead of 1.4 Billion, and by some estimates that its population will soon fall below that of the USA, which is probably the cause of a shortage of low cost labor in China.

Due to its one-child policy China's population had dropped to around 900 million rather than the official 1.4 billion number. As a result, most of the 650 million new apartments that China has built since 2010 remain unsold and unoccupied. Best estimates indicate that China has lost another 300 million to 400 million since 2019 due to mismanagement of the Covid pandemic. So, unlike India with its 1.4 billion people, they don't have the inexpensive labor resources needed to support their domestic manufacturing and to export low-cost products as well.

This situation has been exacerbated by the fact that all urban chines families invested in their only child's education with the promise that their child would have good paying white color job, with a nice car and a house, and be able to support their parents in their old age. Unfortunately, just like in the USA they were conned out of their hard-earned money only to find that there were no white-collar jobs available for their children, who no longer wanted to work for $1/Hour in a manufacturing job.

As a result, China is no longer the go-to place to do manufacturing and may break apart due to social unrest due to massive unemployment amongst college graduates.

But then again, we are seeing a similar situation in the USA where most college educated graduates are not willing to work in manufacturing, even with some non-supervisory jobs paying over $75,000 per year and plant management roles paying $150,000/year or more. These people would rather work as a barista at McDonalds at $15/hour in the hope that their dream job in marketing communications or DEI management will miraculously reappear.

As a result, we have currently have over 400,000 job openings in manufacturing.

And, if things could not get any worse, then along came Trump and his Tariffs, with the idea of creating more manufacturing job openings in the USA, without any notion of who would staff these jobs; especially with ICE rounding up and deporting all the immigrants, both documented and undocumented, who do many of the current non-supervisory jobs in manufacturing.

As of May 2025, there were 8.8 million production and nonsupervisory employees working in manufacturing in the U.S. This category covers roles like machine operators, assemblers, inspectors, maintenance staff, and other non-supervisory workers. In addition, there are about three million front-office managers and staff.

Of the 8.8 million production workers, there are about 1.3 million undocumented workers and about 1.7 million documented workers, or about 3 million in total or over 1/3 of the total, which ICE is trying to deport.

Assuming that ICE only deports the undocumented workers, which may or may not be true, this will leave the USA with 1.7 million unfilled job openings that the approximately 580,000 college graduates, who are currently not working in a professional capacity, are not willing to take. And, even if they were willing, this would still probably leave over 1.5 million jobs unfulfilled.

With an average wage for a production worker in the USA now being over $28/hour, compared with $2/hour in Mexico and under $1/hour in Cambodia and Indonesia, and Vietnam falling somewhere in between $1/Hour to $2/Hour, this has significant implications for the US supply chain.

Prior to the Tariffs it made sense to outsource for most products to outsource their manufacturer to China and simply receive and distribute the resultant products in the USA, with appropriate relabeling and documentation to meet US requirements. As a result, by and large, this China first model has been extensively used by US Manufacturing organizations. But it is starting to break down.

To further understand this problem, let us look at an example of an environmental exhaust gas controller for industrial furnaces. This is essentially a metal box with a computer electronic circuit card inside, plus a power supply, and some sensor inputs and control outputs.

Let us assume that this box sells for $1,200 with the pre-Tariff price from its Chinese final assembly plant of $1,000. The current tariff on such goods is 35%, which means that the US seller of these products, will now lose $150 per unit sold. They could raise the prices but, if they could have raised prices competitively they would have done so previously.

So, what is the answer?

The answer is as follows:

1. Purchase the computer boards fully stuffed, but without the main computer chip, from somewhere in the far east. Probably cost $80 plus tariff of 10% if from India and 20% if from Vietnam, plus shipping – say $120 in total
2. Purchase the metal case, with connectors and power supply and wiring harness from Mexico. Probable cost $180 with zero tariffs if USMCA compliant – say $200/unit delivered
3. Do final assembly in USA $154:
    a. Insert computer board into metal box and connect to power supply and connectors 30 minutes = $18.
    b. Insert Computer chip into board - $100 for chip
    c. Run test on unit 30 minutes = $18
    d. Put “Made in USA” label on product - N/C
    e. Put labels on unit and package, plus do computer data entry 30 minutes = $18

This results in a total estimated cost of $454, with a profit of over $700, before warehouse distribution costs. Note also that, in this case, we need relatively little time from relatively high paid production workers in the USA, which is good because we do have very many of these people.

So, given the cost savings, why didn’t everyone do this before?

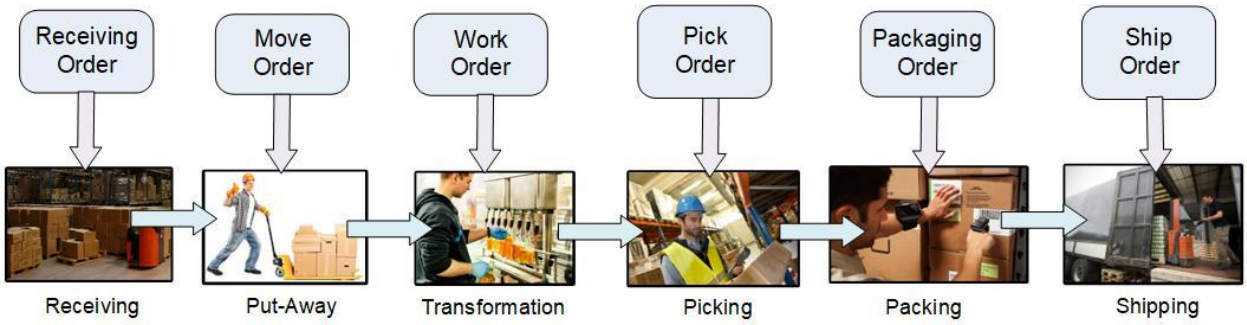
The reasons are:

1. Without tariffs and before China’s labor rates crept up from under $1/Hour to over $5/Hour, it was cheaper and easier to go the China for complete assemblies.
2. Now with relatively high labor rates and 35% tariffs, buying complete assemblies from China no longer makes sense. This only became apparent during the Covid pandemic but has been exacerbated by China’s increasingly aggressive anti-USA stance.

3. Managing complex supply chains, with components coming from many countries and many suppliers, is much more difficult than simply waiting for an ocean freight container with finished products to arrive in LA.

In order to take advantage of labor rate and tariff arbitrage in many different countries, we need to be able to track and manage materials in real-time as they flow through a sequence of manufacturing plants and warehouses, as well as through various shipping organizations.

This cannot be done with methods such as paper forms, Excel spreadsheets, and the manual entry of data in ERP and accounting systems



Instead, this requires a system, such as SmartOps24x7 (www.SmartOps24x7.com), which is capable of automatically converting a flow of incoming customer orders into purchase, manufacturing, and shipping orders, which are then sent to a distributed network of manufacturing plants and distribution warehouses for action.

It also requires a system such as SmartOps24x7 to capture the status of operations throughout the supply chain, so that this can be used for real-time automated planning and scheduling, as well as to keep senior management and their staff appraised of issues that they need to pay attention to.

Author

This white paper was written by Dr. Peter Green, who serves as the Technical Director of a number of software companies. Dr. Green also consults to manufacturing companies on the application of real-time intelligent systems to improve their manufacturing and supply chain operations.

Dr. Green obtained his BSC (Hons) in Electrical Engineering and his Ph.D. Degrees in Electronics and Computer Science from Leeds University in England. Subsequently Dr. Green was a senior member of technical staff at Massachusetts Institute of Technology and a Professor of Computer Engineering at Worcester Polytechnic Institute.

Dr Green is a Systems Architect who is an expert in using real-time artificial intelligence methods to implementing real-time operations tracking and management systems for industrial organizations. He has led the implementation of over 100 such systems over the past decade. Dr Green also led the team which developed the SmartOps247 real-time artificial intelligence software platform and the BellHawk operations tracking software.

For further discussion, or to send comments, please contact Dr-Peter-Green@SmartOpsMgt.com.

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