Collapse of Our Global Supply Chains
Disaster or a Golden Opportunity for US Manufacturers

I have just finished reading the new book: "The End of the World is Just the Beginning – Mapping the Collapse of Globalization" by Peter Zeihan. This is an excellent book and is recommended reading for anyone involved in manufacturing in the USA.

I disagree with Peter on some specific points, such as the invention of interchangeable parts, which were not invented as part of the American Industrial Revolution, but by the Chinese 5,000 years ago for making cross-bows and the bolts they fire. I do, however agree with Peter in his central thesis that we are at the beginning of a Global Supply Chain collapse, as I see it happening with my own eyes.

Global supply chain collapses are nothing new, the earliest being documented about 3,000 years ago in the bronze-age and the latest in the World War I to II period (1914-1946). Since World War II the USA has been the world's policemen ensuring safety of our global supply chains and the growth of Globalization in our manufacturing supply chains.

Now all that is ending, as the USA has become poorer as a nation, much of our manufacturing is outsourced overseas, and the political will is no longer there to police and support global supply chains.

Many ordinary working-class Americans are asking the question of "How come we are spending all this money overseas and outsourcing all our high paying jobs overseas, when we have homeless people living in our streets? Why are we not taking care of our own people?"

Politicians, despite being largely tone deaf, do ultimately have to respond to the will of the people if they want to get reelected. As such, the funding and the effort being put into policing the global supply chains is rapidly declining and, with the imposition of tariffs that favor voters, rather than our offshore adversaries, we are now seeing the breakdown of Globalization.

As a result, supply chains that reached around the globe are now being replaced with regional supply chains that do not need the USA to guarantee world peace.

Peter Zeihan does an excellent job of analyzing the likely outcome from such a collapse, which is that in future manufacturing of products sold into North America, which is the world's largest market, will mostly be made in the USA, Canada, and Mexico. As a result, manufacturing will likely double in the USA over the next 5 years, provided that we can get the people to run these operations. This is not just some future prediction, as we are already seeing manufacturers in the USA shifting to an in-market manufacturing model for the whole of their supply chain.

Gone are supply chains requiring 7,000-mile ocean voyage through increasingly unfriendly seas, where, for example, ships traversing the Gulf of Aden off Somalia now require armed escort ships. Now it's all about NAFTA and local supply chains, with maybe some raw materials mining being done in South America.

In one sense this is a golden opportunity, as all those manufacturing jobs that disappeared to China and elsewhere in Asia over the past 40 years are now potentially coming back to the USA with a vengeance, if we can get the people to staff them.

This could, on the other hand, turn into a disaster, if we cannot get the people we need, with massive supply chain shortages occurring throughout the supply chain.

So, why are we short of people in manufacturing?

1. We do not pay enough. The average pay for a factory worker is $50,000 per year, in 2022, which is less than the national average wage of $55,000/year.

2. Manufacturing today requires a much higher level of skill and training than was previously required.

3. Today's working age cohort were told that by their parents that they should not go into manufacturing as it was dirty, dangerous work that paid poorly and had poor job security.

If we are to attract the people we need, we will need to pay them more, provide batter training, and then make much more efficient use of their time, if production costs are to be contained.

Some of this we are able to solve by the use of numerically controlled (N/C) machines. One of our clients was able to reduce their number of production workers from over 50 to just 6 by replacing manually controlled machines with N/C controlled machines. But they still had over 30 people in the front-office to manage the manufacturing process.

Note that the use of N/C machines is not "an automated production line" or "robotics". Here we take the CAD (computer aided design) output and generate programs that tell the machine (mill, lathe, or 3D printer) how to make a part. Once loaded with feedstock, the machine can then produce parts in small quantities on a just-in-time basis. This enables one operator to run several machines at a time to make needed parts in small batches, without having to manually setup and control the machine for each job.

This is great, but we still have a small army of people in the front-office to manage the manufacturing process including designing product, purchasing raw materials, planning and scheduling production operations, making sure that the correct feed stock mates up with the right N/C program on the right machine, as well as the packing and shipping of the products in response to customer orders. Much of this activity involves intelligent "grunt" work, usually

based on the use of Excel spreadsheets plus the need for time consuming coordination and planning meetings.

The obvious solution to making front-office staff and managers more efficient is to employ Artificial Intelligence software to carry out the grunt work automatically without human intervention. Software platforms are offered by a number of companies to assist in automating this grunt work. These companies include Palantir, C3I, UiPath and KnarrTek.

KnarrTek helps solve this problem, through the use of its MilramX software. MilramX uses Intelligent Agents (sometimes called software robots) which are scripts, written in Python, that automate much of the intelligent "grunt" work, which would otherwise require many hours of management or staff time.

What sets MilramX apart is its affordability (a few hundred dollars a month), its focus on manufacturing, warehousing, and supply-chain distribution, and its ability to manage hundreds of intelligent agents all working in parallel to perform the intelligent grunt work throughout the industrial enterprise. Most importantly, it provides a framework in which business analysts can easily develop their own scripts and integrate these into the operations for the whole enterprise, without needing to be expert software developers.

While the staff of KnarrTek can develop scripts for its clients, with appropriate training and support from KnarrTek, clients can develop their own scripts, which can result in substantial cost savings. It also enables clients to change these scripts whenever business needs change without needing to come back to KnarrTek or some other developer to make the changes.
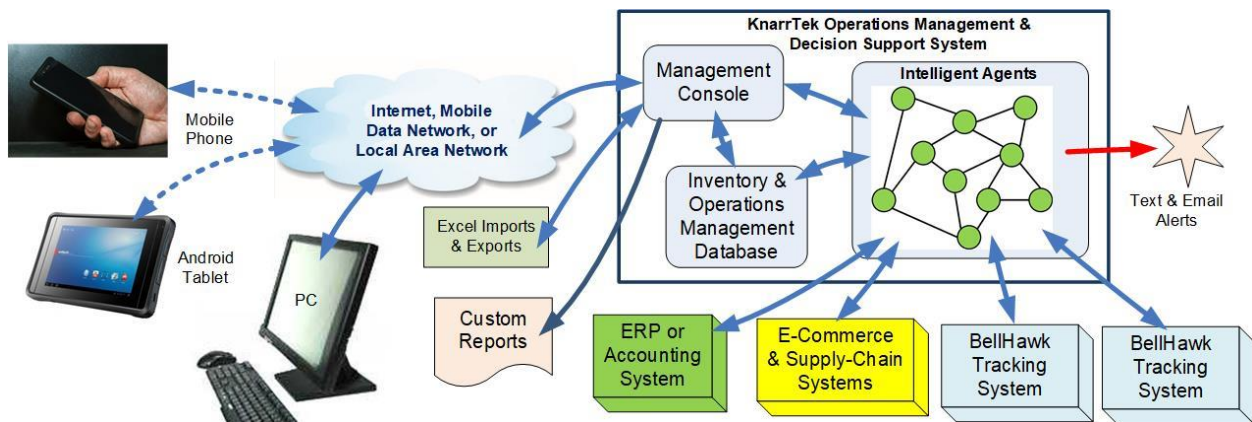
Intelligent agents run 24x7 and can monitor operations, by interfacing to an operations tracking system, such as BellHawk, a wide range of ERP or accounting systems, Computer Aided Design, EDI, E-Commence, and other supply chain systems.

Based on the changes the agents observe, some of the actions they can perform are:

1. Create purchase orders to order needed materials

2. Schedule and plan manufacturing operations, down to the machine and N/C program to be used.

3. Schedule and plan the picking, packing and shipping of customer orders.'

4. Automatically interact with EDI systems.

5. Monitor manufacturing and warehouse operations and send alerts by text message or Email when intervention is required.

6. Send reports to managers who need periodic reports on progress

7. Automatically exchange needed information with customer and supplier supply chain systems

By automating processes such as these, we are able to reduce the number of people needed to run each manufacturing plant by relieving them of many of their routine tasks. This also enables managers and staff to focus on tasks that need their specialized knowledge and management skills.

By modifying the Python scripts, clients are able to tailor the agent's decision making to the specific operational processes that make the business successful. This encapsulates the institutional knowledge, which means this institutional knowledge does not walk out of the door for a higher paying job elsewhere. It also makes it easier to recruit new people, as they do not have to reinvent the needed processes to do their job.

With a comprehensive set of agent scripts, KnarrTek enables manufacturing operations, especially those in multiple plants, to be managed by a much smaller team of people than was required previously. This can go a long way to making maximum use of available people resources, especially when operations must be expanded dramatically to cope with shortened supply chains.

One final question that I get asked is "How expensive is it to develop all the scripts needed to automate the management of my manufacturing operations?" The answer is that the cost is typically half the loaded labor cost for one year of the people you will save by using an intelligent agent system. Or, put another way, typical cost for script development is between $25,000 and $150,000 for a labor savings of between one and three people if the scripts are developed by KnarrTek and substantially less, if clients do their own script development.

Please contact Peter.Green@KnarrTek.com, if you would like to learn more about Intelligent Agent based systems and would like to explore whether they have a place in your organization.

Author

This white paper was written by Dr. Peter Green, who serves as the Technical Director of KnarrTek Inc. 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 Inventory Tracking and Operations 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 BellHawk materials tracking software and MilramX real-time artificial intelligence software platform.

For further discussion, or to send comments, please contact peter.green@KnarrTek.com.

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