

VALUECHAIN

Insights from Technology Thought Leaders



Interview with Yossi Sheffi

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Professor Yossi Sheffi

Director, MIT Center for Transportation & Logistics
Massachusetts Institute of Technology

You've built a career around a discipline that the world is finally aware of.

For 40 years, people have asked my wife, "What's your husband doing at MIT?" She would tell them, "He's doing research on supply chain management." They'd ask, "What is that?" Several weeks ago, she went to Whole Foods to buy something, and they didn't have it. She asked the 16-year-old cashier, "Why don't you have this product?" He replied, "Well, we have a supply chain management problem."

What's your personal backstory?

I grew up in Israel and studied at the Israeli Institute of Technology. As many Israelis do, I served in the Israeli Air Force for six years. I attended graduate school at MIT, and did most of my work in applied mathematics and operations research. My first job was in urban transportation and transit planning. In fact, my first book was about urban transportation networks, but it was very academic. Good for PhD students at MIT, but not for the general public. I was

frustrated working in this area because I believed there are better ways to operate transportation in cities. But nobody listens, and not much was implemented.

What sparked your interest in logistics?

I got involved as a consultant with a company called IU International, which owned a few truck lines, where I applied some of the same network theory and design elements to trucking operations, and lo and behold, they worked. As an engineer, I like to analyze real data, to see it applied, and to make a difference. I began working in transportation with several trucking lines, and started a company that developed software for optimizing trucking operations. In fact, 30 years later, many trucking companies are still using a lot of the software or variations that I developed.

Then I moved to users of the transportation system, and together with a friend we started a third-party logistics engineering company. It began as a unit of Rockwell International, where my friend had worked. It grew very quickly, so after three years, we found some investors and bought the

company from Rockwell. We left Rockwell with about a \$40 million company, and three years later, we were a \$600 million company. This was before the internet, and it went gangbusters, but we didn't have the management expertise to run a company that size. We eventually sold to Ryder, where it's now probably a \$3 billion part of that company.

I started several other companies in the logistics and supply chain area, working with shippers to optimize procurement operations and working with retailers to align with manufacturers. They all got reasonably successful and were all acquired by larger enterprises. In the end, I like teaching, I like research, I like writing books and papers. I didn't want to leave MIT; and that's where I've stayed.

You've built a significant franchise at MIT.

In the 90s, I took over MIT's Center for Transportation & Logistics, and it's grown substantially into a multi-million dollar operation. We have our own education program, and offer a Masters Degree in Supply Chain Management, which was the

first interdepartmental program at MIT. We founded five academic supply chain management centers around the world, in Colombia, Spain, Luxembourg, China and Malaysia, and we're negotiating the opening of another center in the Middle East. We were also the first department to offer a serious online program at MIT, called MicroMaster, that has 450,000 learners around the world. With the current supply chain issues, we're already seeing the number of applications to all our programs go up significantly.

You've been writing about supply chain resilience for a long time.

My first book that dealt with risk management and resilience, "The Resilient Enterprise," was written in 2005, and I wrote "The Power of Resilience" in 2015. Both books dealt with disruptions, but it's important to differentiate between the two different types of disruption. The first type is supply disruption, which happens all the time, whether it involves hurricanes like Katrina, or a tsunami coupled with a nuclear disaster or tsunami in Japan. Most often, these disruptions are local and have a very limited duration.

The second type of disruption, what we are experiencing now, is a demand disruption. It's unprecedented, global, and difficult to get out of it. At the beginning of the pandemic, demand went down, and people accumulated money. They couldn't go out to the movies or dinner, to the gym or to stores. They couldn't travel. The government gave them money on top. Then when the pandemic started to abate and with vaccination available, demand went through the roof, and supply has not been able to catch up.

What we have now is a huge imbalance, fueled by skyrocketing demand for products, lack of workers, by problems in China, and by transportation issues. But the underlying

issue is the amount of money that people have in their pockets right now, which they use to buy everything under the sun.

Have any companies followed the guidance in your books?

Intel is a company that was very well prepared for the pandemic, and General Motors had good processes that I've described in several of my books. Walmart also does very well because they have an emergency operations center where all supply chain information is directed, and all decisions are made in the same place. Companies like Intel, Walmart and Cisco conduct drills and practice responses, so people know what to do when there's a real problem. They've built a culture and process to deal with disruption.

The difference between the business environment that existed around the time of my 2005 book and my more recent books is significant. Companies are now taking risk management and business continuity planning much more seriously. That also includes suppliers in their preparations and suppliers now must show *their* business continuity plan to the companies they work with. Things are getting better.

Your "Shot in the Arm" book describes the vaccine as the greatest product launch in history. Can the same approach be applied to other global problems, such as climate change?

With the pandemic, there was an unprecedented degree of cooperation between governments, companies, and scientists, as well as trillions of dollars invested to solve that problem through technology. However, a large part of the population still cannot be convinced to

vaccinate, to put on masks, or to social distance. More than a million US citizens will likely die from the disease. The antivaxxers know people who've died, they know people who have long Covid problems, and they're still not going to cooperate.

In your book, you compare the pandemic to global warming.

How can we expect to tackle problems like global warming in this environment? Can we expect that same 30 - 40% of the US population who do not believe in vaccination to consume less, to fly less, to drive less, to reduce their standard of living in order to address a danger that's decades away, if they are unwilling to do something to reduce a danger that's staring them in the face today?

Five years ago, I called for a similar global effort to reduce the carbon already in the air. We need the same level of investment and cooperation to develop technological solutions for climate change, because just like the pandemic, it's a global problem. The pandemic will not end until everyone is vaccinated; not only in the US, but in Africa, South America, Southeast Asia, and Russia as well. The same applies to global warming. Californians can all drive electric vehicles, but as long as India remains committed to coal, it doesn't matter, because it's a drop in the bucket. We need global solutions, and I don't believe we can get countries to reduce their citizens' standard of living. Their political leaders will be thrown out of power. The underlying issue is that trying to convince people to reduce their standard of living is a losing proposition.

Can you offer a more optimistic outlook for the environment?

My book, "Balancing Green," is all about sustainability, and the solution is technology.

There are technologies that not only reduce the rate of growth of emission, but also take the CO2 and methane, all the greenhouse gasses, out in the air and cool the planet. There is a whole set of technologies called carbon capture and sequestration (CCS) that takes carbon out of the air, and we must develop, scale and apply those tools. Current approaches are simply not enough. Even if all the countries in the world will actually do what they committed to in the Paris Accord or the Glasgow Agreement (they will not), this will not be enough. The reason is that 2/3 of the world's population are living on less than \$5 a day. But they want air conditioning, they want to drive cars, and they want to eat meat. Do we tell them they can't have those things because they happen to live in Africa, or in South America? No, because that's immoral. We must find a way to remove the carbon from the air and let everyone have access to a standard of living that they aspire to.

What are some of the most important capabilities of a world class supply chain organization?

First, companies need good processes supported by the right technology. In many cases, companies are implementing technology without addressing the underlying process. For example, if you don't have good relationships and understanding of your suppliers, getting supply management software is not going to help, because you're putting it on top of a broken process.

Smart companies also have a visibility technology to understand what their suppliers are doing. They're trying, with limited success, to get beyond the first-tier supplier to understand what second and deeper tier suppliers are doing, which is difficult.

Companies are using software to redesign their supply network almost on the fly, enabling them to onboard new suppliers quickly. When a problem arises, or even to be prepared ahead of time, they can perform fast quality assurance on a supplier. Naturally, such systems do not help them get a semiconductor any faster than the next guy when the disruption is in the scale of the current pandemic. However, in more typical disruptions such as a fire, or an earthquake, or a strike, companies are using advanced systems to help them identify very quickly where the problem is, which of their customers are impacted, and what should be done about it. If they know a particular supplier is going to be affected for two or three weeks, and they're not going to have certain parts, then they know immediately what products and customers will be affected. Within seconds, they can tell what value is at risk and can immediately address the issue. That's something that world class companies are investing in.

Is technology also the key to supplier relationships?

To create good relationships with suppliers, or with customers, technology is not a panacea. You still need to fly to China and sit with a supplier, to have dinner with them and talk about your kids and their grandkids and create a human connection. As many companies have discovered, when they've called a supplier during a big disruption and said, "I must have something," there must be a personal relationship based on trust. Suppliers and customers alike need to know that they are being told the truth with respect to their needs and the availability of supply.

We currently have a situation where many OEMS are ordering far more than what they needed, and much more than they can sell, because they're unsure whether their supplier will put them on an allocation. Being unsure of supply, they order a lot

more, which has exacerbated the current crisis. It's the toilet paper shortage on industrial scale. The situation will improve when demand goes down, as interest rates go up and inflation cools down demand, but it will take some time.

Has the pandemic put an end to just-in-time logistics?

Absolutely not. It's not the end of just-in-time. People think the purpose of just-in-time is to reduce costs by limiting inventory. But that's not the case. Just-in-time was designed to increase quality, and as a result of better quality, there are fewer warranty problems and product recalls, so costs go down. It also helps in responding to all kind of disruptions, because just-in-time creates a stronger connection between the manufacturer and the supplier, and between the manufacturer and customers.

Why is just-in-time concerned primarily with product quality? Let's say there's an assembly line with a large pile of parts. If one of those parts is defective, the line worker throws it away and takes another part from the pile. The underlying problem leading to the defective part is not addressed or fixed. Fixing this was the philosophy behind Toyota's just-in-time production system. In their system problems were investigated immediately and fixed; not letting any more defective parts go through. This avoids warranty and repair problems, as well as reputational issues, all of which increase costs.

I don't think companies should stop using just-in-time logistics, with the one exception being Personal Protective Equipment and medical supplies, where similar to the National Petroleum Reserve, we should maintain a central inventory of four or five months, which provides enough inventory until industry can retool itself. Other areas can be parts and products that affect national security.

What will be some of the most enduring positive impacts of the pandemic?

The biggest positive impact will be on virtual medicine, because during the pandemic we had to see doctors online. A lot of apps were developed for this, with all the proper privacy safeguards. This points the way to having people around the world gain access to advanced medicine. There's no reason why people in remote parts of Africa cannot have access to a doctor at Massachusetts General Hospital. They can take a lot of tests locally and transmit the results to a leading hospital. Some of the best doctors in the world can treat them. Like so many things, virtual medicine existed before the pandemic, but few paid attention to it. But we discovered that a lot of things can be accomplished virtually.

Another beneficial result of the pandemic is greater awareness of how products and services are delivered. I believe there is now greater respect for frontline workers, whether it's a cashier in the supermarket, a nurse at the hospital, a warehouse worker, a truck driver – all the people who make the country work. I'm hopeful that this will also result in higher wages, benefits, and personal recognition for those individuals.

Writing books is a major undertaking. How do you discipline yourself to do that?

First of all, I don't play golf. When I exercise, it's games like squash or walking with my

wife, that take 30-45 minutes. I like to write, so I schedule blocks of time to do it. I usually set four-hour time periods, because it takes me at least an hour to read what I've already written and to re-write a lot of it. Then for the last two hours, I write new content, or add something to existing content.

There are a lot of other demands on my time, including the work with my students, managing a very large academic center at MIT, and dealing with other issues. I also continue to consult with companies, as it keeps me connected with what's going on, what the problems are, and what people are doing about them. By keeping my finger on the pulse of business, I continue to learn.

I would imagine that the word "retirement" is not in your vocabulary. Is that true?

My wife and I agree that it will be long, long time before retirement. I don't have hobbies. My hobby is my work. I try not to watch too much Netflix. On long flights I read trashy spy novels, but I don't have many things that take my time beyond thinking, writing, teaching, and working with students and colleagues. That's all fun for me.

Has there been a person, a book, or a phrase that's served as a source of inspiration?

When I flew planes in the Israeli Air Force, after the Yom Kippur War in 1973, my base

commander conducted what I thought was an unflinching analysis of what we had done right, what we did wrong, sparing no one. We learned quite a bit from that honest debriefing. Years later, I realized how rare it is for people to admit their mistakes, to analyze them, and learn from them in order to improve.

Another person that I was privileged to know was Colin Powell. I had several meetings with him, and greatly admired many things about him. His wisdom and goodness were exceptional, and I have always looked up to him as a role model.

Has living in Boston made you a Red Sox fan?

As an Israeli who grew up on soccer, I can't get myself to enjoy baseball. I have this argument with everyone around me, who all are Red Sox fans. I believe that any game where you don't sweat is not a real sport. Interestingly, I enjoy hockey because the strategy is the same as soccer. The game moves fast, and you send the puck or ball to where the guy is going, not to where he is. Although I'm not a fan of baseball, as an MIT student and faculty member I've enjoyed playing pick-up softball games. Again, it's not a sport, it's a social activity. You drink beer, and play a little softball. I can certainly enjoy that.

Yossi Sheffi Biography

Dr. Yossi Sheffi is Elisha Gray II Professor of Engineering Systems and Director of the MIT Center for Transportation and Logistics (CTL). He is a global expert in supply chain management and is a multi-award-winning author. His sixth and latest management book, published in October 2021, is *A Shot in the Arm: How Science, Engineering, and Supply Chains Converged to Vaccinate the World*.

Outside academia, Dr. Sheffi has consulted with numerous organizations. He has also founded or co-founded five successful companies, all acquired by large enterprises. Dr. Sheffi has been recognized in numerous ways in academic and industry forums, winning multiple awards and honors.

For more information visit: <http://sheffi.mit.edu/>

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