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Ron Lisnet

Patti Miles

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S5E10: Why is the supply chain bogged down?

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Supply chain problems are occupying many people's minds, especially with the holidays around the corner. Numerous newspaper stories and TV segments have featured images of cargo ships waiting for days or weeks to unload their goods from Asia into ports up and down the West Coast. Americans are witnessing shortages of many products they once took for granted, including lumber, various food items and computer chips, among others. Demand for goods has grown, yet producers are struggling to keep up after a slowdown caused by the COVID-19 pandemic.

In this week's episode of "The Maine Question," Patti Miles, an associate professor of management science with the Maine Business School at the University of Maine, breaks down the issues surrounding supply chain woes. She discusses the bottlenecks and other problems, when they might ease and whether people will get their holiday gifts on time.

Transcript

[background music]

Patti Miles: It's just shocking when you hear the numbers. The largest cargo ships, these container ships, carry about 24,000 TEUs. Again, those are those big metal containers we all see. Just to give you some context, if you were to take these 24,000 TEUs and line them up end to end, you'd have a 90-mile long row of containers, or a 45-mile train, because we double-stack them, usually, on trains.

Ron Lisnet: That's Patti Miles, Associate Professor of Management Science in the Maine Business School at the University of Maine, talking about the immense size of the cargo ships that deliver many of the things we buy to our country. Those ships are now caught in the world's biggest traffic jam.

I'm Ron Lisnet, and this is "The Maine Question" podcast.

Whether we like it or not, most of us are getting a crash course in how the global economy works, or doesn't work, these days. There are shortages of many of the products and materials we once took for granted. Lumber, cars, computer chips, and just about every

other product you can think of have been affected by a few kinks in, what is known as the global supply chain.

As the economy recovers, demand is way up for a lot of products. Production is down due to the pandemic. Cargo ships are stuck outside major ports, like Long Beach, California, sometimes for weeks on end. With about 40 percent of what we buy coming from Asia, going largely into the ports of Long Beach and Los Angeles, the traffic jam on the water is pretty severe.

On top of that, our behaviors are changing. People are spending more time at home, working on their houses and gardens, traveling, and going out to eat, less. With all of this converging at the same time, it's little wonder the global economy is taking a hit, and that all we want for Christmas might possibly not get here in time.

This kind of logistical problem is something Patti Miles has made a career out of studying. It's a kind of complex problem, with tons of variables, that she loves to dig into. Starting in the military, she has worked on setting up global supply chains. Now she teaches UMaine business students how the whole system works.

She spoke with us about that, and the logistics of what it takes to make, ship, and purchase the stuff we buy.

Ron: Patti, thanks for joining us. We could probably spend hours talking about this. It's certainly a complicated issue. If you had to boil it down or put it in a nutshell, how did we get here? What happened to get us to this point?

Patti: From my perspective, there's a whole host of reasons how we got here. I'm going to focus on some of the biggest obstacles that there are out there, and the most difficult to untangle.

The way I see it, there's three big obstacles. The first is the structure of the ports system in the United States. Ports are owned by towns, for the most part, especially on the West Coast. They're owned by towns, and so upgrades to the ports are usually not funded by the Federal government. The towns can't afford it either.

Just one example, in 2020, nine percent of the annual budget came from government agencies, for ports in general, which is, of course, a tiny amount. The ports cast capital campaigns out there to raise money for major renovations, but it's just mind-boggling to consider how these processes affect these ports.

For example, the Port of Long Beach processes about eight million TEUs, which are those big containers, a year. 2018, that was a high year for them. In 2021, all of a sudden now, so just a couple of years later, they have already processed more than they processed in 2018.

They have processed 8.1 million TEUs as of September, with several months left in the year. They will way exceed what they're used to doing. It's not that they don't have the capability, they do. For example, the Port of Long Beach has 80 berths, 22 shipping terminals, and they employ 51,000 people. It's just not enough when it ramps up so quickly.

Right now, currently, I just checked this morning, there's 35 vessels waiting outside of the Port of Long Beach and Los Angeles. They wait an average of 17 days, is what this says, but some of them have been waiting for 46 days. It takes a while. Once they get into port, then it takes 10 to 14 days. They've got to get them all offloaded, and then get them turned around and ship them out again.

That's problem number one. Problem number two is, the containers all need chassis to be useful. One of the issues with the independent nature of the way ports have evolved in our country, is this chassis business. Chassis, essentially, you set the cargo on it, and then you can hook a truck up to it and drive away. On the West Coast, all of the chassis are maintained by the ocean carriers.

Maersk, for example, they don't want to necessarily share their chassis with Del Monte, or some other company, and so now, the chassis that are available aren't necessarily able to be utilized because they actually are owned by another entity.

On the east coast, this isn't necessarily the case. Virginia and South Carolina's ports are both actually operated by the state. They have created these chassis pools which they could use. However, the ships that are on the west coast can't necessarily just zip over the east coast because it takes them about, if you can believe this, 10 days to get there.

Some of these ships that are over on the west coast are so large they cannot pass the Panama Canal. They're post Panama Canal-sized ships, so it wouldn't even be possible.

I would say the third issue is the issues around the trucking in the US. Labor, and how the payment is made in dealing with these containers and the chassis, there's this company called Hapag-Lloyd, and they report a \$4.2 billion earnings increase in the first half of 2021. That's due mostly in part to this increase in shipping costs. They pay between \$500 and \$700 to have a container moved, but the poor truckers get \$50 to \$75 for moving that same container.

The other problems with the trucking system is that they only get paid from moving their cargo from point A to point B. The amount of time it takes to do this is all on them. With all of the ports, and all of the system so clogged, they lose a ton of money because their spending a lot of time sitting around.

They used to be able to get in and pick up their container in a half hour. Now it takes at least an hour, if not longer. Before this Motor Carrier Act of 1980 that changed everything, then the ports owned the capability to truck the stuff out. Now that's all been decentralized and gone to these trucking companies.

Really, I think at the end of the day, the problems are just so macro, but they influence these ports in so many ways that, we love the free market, but it does have its downside, and here it is being manifested, I think.

Ron: We always hear that metaphor of it takes a long time to turn around an ocean liner. In this case, it's literally true. Right?

Patti: [laughs] Yes. It is very true, for sure.

Ron: Take us through some of the basic brushstrokes of how the global supply chain works. China and Asia produce a lot of goods that we consume. Talk about the way stuff flows into our houses and our lives.

Patti: The US imports about \$220,700,000,000 worth of products, and we export way less than that, by about half, \$134,150,000,000. In the US, in 2021, we have already imported more than that, and 42 percent of that comes from Asia.

This makes the ports on the west coast, obviously, really busy. Because of all these issues, that I just was talking about, it makes the problem so complicated, all because of this whole chassis thing. There's the berth issue, which is what's causing the back up.

Once they get in the berth, they can't always get everything offloaded the way they want to because, related to all this is these labor shortages. The people that need to be working the ports, there's so much more time off for sickness related to the global pandemic.

The current shipping containers are stacked five deep at the Port of Long Beach and Los Angeles mostly because they just can't get the chassis married up with the containers, and the truckers married up with the chassis to move the containers across the globe, or whatever, wherever they're going.

So much stuff, it's just hard to imagine how much stuff actually comes into the west coast. That's mainly because we get so much of our imports from Asia.

Ron: How much of what we buy does come through Los Angeles and Long Beach? Is that a bottleneck?

Patti: Definitely. That's a huge bottleneck because roughly 42 percent of everything we buy comes through the west coast. That's just durable goods. That's not even including all of the other myriad of things that get shipped, cars, all kinds of chemicals, et cetera.

This is just durable goods, 42 percent of which come through the ports on the west coast. The Port of Long Beach and the Port of L.A. are often in the news because they're the deepwater ports out there, and these big ships really need deep water.

Consider this, in 1995, the Port of Long Beach processed, and that's inbound and outbound, and moving around empties, about 2 million TEUs of freight. That's the big, huge steel containers. In 2020, the port processed over 8 million TEUs, which is an increase of 185 percent in just 15 years.

To provide a context to that, if we took 8 million TEUs and strung them together end to end, the train would stretch some 30,732 miles, which is longer than the Earth's circumference, which is just about 24,900 miles.

This was not always the case at the Port of Long Beach. Just 10 years ago, the TEUs strung together would not quite close around the Earth's circumference, with them stretching about 23,725 miles. This is really a lot of durable goods coming from the ports in Asia, but I think that the details are really a little bit more shocking.

They really illuminate the complexity of the situation. When you examine the TEUs processed by month at the Port of Long Beach, what's really striking is that the average monthly processing over the years at the Port of Long Beach, between 2020 and 2021, the average monthly increase is about 16 percent. That's just a monthly increase.

If you don't like comparing to 2020, because of the pandemic, and we go back to 2019, then the increase between 2019 and 2021 is 24 percent. This is a lot of additional stuff that they are processing. If we continue with the containers converted to miles, the increase between 2020 and 2021 is some 425 miles long.

If we look at between 2019 and 2021, then the distance is some 577 miles. If we put that in terms of road mileage, the distance that the 425-mile gap would cover would go from [inaudible 12:52] down to New York City. If we consider the difference between 2019 and 2021, now we're talking about 577 miles, which would get us all the way to Philadelphia, Pennsylvania.

A monthly increase of 16 percent doesn't really seem like much when you're talking about eating a little more for the holidays, but it is quite a different story when we consider moving TEUs.

Ron: Just talk a little bit about the logistics of all this. It's sort of fascinating to see these ships and how much they carry. How big are they? How much can they hold? You talked about how they get to our store shelves, but just the logistical feat to get it across the ocean on these boats, it looks unbelievable, really.

Patti: It's just shocking when you hear the number. The largest cargo ship, these container ships, carry about 24,000 TEUs, those are those big metal containers we all see. Just to give you some context, if you were to take these 24,000 TEUs and line them up, end to end, you'd have a 90-mile long row of containers, or a 45-mile train, because we double stack them, usually, on trains.

These ships, themselves, while they're floating out on the ocean, they're about six stories high and about 1200 feet long, or about 3.3 football fields, and about one football field wide. These ships have this draft that goes down underneath the water about 50 feet.

These are the sorts of ships that have a difficult time passing the Panama Canal. They call them post Panama ships. The locks are not set up for this size of a ship. That's the container ships that are carrying all these durable goods that we're talking about.

There's also tankers. Tankers are the big ships that carry all kinds of liquid. They're a little bit newer end of the shipping industry, because we didn't realize we could carry bulk liquid until much later. They carry about 550 thousand deadweight tonnage, and they carry all kinds of stuff, like oil, liquified petroleum gas, natural gas, chemicals, ammonia, chlorine, freshwater, wine, molasses, and citrus juice.

All of this stuff requires pumping on and off, and particular types of ports. Out on the west coast, this kind of stuff doesn't necessarily always come into the Port of Long Beach and the Port of L.A. because they're much more set up for containers.

A lot of this stuff, there's a big port for this up just near San Francisco in a place called Richmond, which is very close, by the Oakland container ship. That port in Richmond allows the offload of this kind of stuff.

The third type is these RoRos. It's short for roll-on, roll-off ship. These ships really became big in about 1965, '70, when Toyota started really producing in earnest for the US. These ships carry some 8000 cars across its 10 to 15 decks. The average type of ship like this carries about 6500 cars on 12 decks. Most of these cars are driven on and off.

They can also use these ships and this thing called a self-propelled motor transporter that's like a big platform and it can carry on really big vehicles. It can be used to process big sections of bridges or oil-refining equipment and cranes, and other special stuff, because these vessels are able to...Yes, they have 15 floors, but they can move these floors around, allowing for much larger cargo to be held in their hold. They also bring a huge amount of stuff into the United States.

Those are our three big shipping mechanisms in the US.

Ron: Let me get my head around this. When you talk about a container, that's basically the back of a tractor-trailer, more or less. Correct?

Patti: Yes.

Ron: So there's 24,000 of those on one ship?

Patti: On one ship.

Ron: It boggles the mind. Then, there's a boat with 550 tons of orange juice floating around out there somewhere, potentially.

Patti: Isn't that just hard to believe? And molasses they also put in these things. Who knew? And wine.

Ron: That's the one that might get hijacked the first, I guess. Right?

Patti: Yeah, I guess so. Maybe have to worry about that one from the pirates.

Ron: I'm curious. How did you get to the point that this is something that you're interested in digging into? What do you study and teach? Is a complex problem like this, that has all these different variables and logistics, is that something that you really like to dig into?

Patti: I absolutely love digging into this. I've enjoyed doing a ton of research for a class I'm currently teaching, about supply chain. I have to say that my career as a logistician started when I joined the Army, back in the mid-1980s.

Just by luck, in about my the third year of the Army, I found myself working at a port in Pusan, Korea. I was running an airborne unit in Korea, but because of the nature of our unit, we had to work with the Navy to support special operations, that was just part of my job. Working with the port in Pusan, I just thought it was so fascinating. Anybody would think it was interesting.

Then, I progressed on up the ranks. When I was working in a special cell in support of Operation Iraqi Freedom, as a member of Joint Forces Command in Norfolk, we were faced with some real big problems on how to get equipment across the ocean, to facilitate the invasion to Iraq. We just didn't have enough ships that we needed to get everything over there.

I began looking to see what we could do about it. What I ended up deciding to do, was to take a port from Virginia and move it to where we needed it to be, in order to offload all the equipment, which got me much more interested in how the supply chain works.

Then, even as we got the port set up and we started moving equipment, at this time, we didn't have RFID technology very well developed. Later, our office would come up with a

much better RFID technology, but at the time, we didn't have anything. The stuff is moving, but we don't know what's moving, and what's going to be there, and where to find it.

That just got me so fascinated into the idea that you can't do anything without the stuff you need. Having some system for tracking is obviously important. After I finished all that work with the Army, I began researching the Port of Long Beach, just because I was interested in it, because I used that as a model for what I was trying to do with the Army.

Then, when I applied to PhD programs about a little bit later...After I left the Army, I decided I wanted to be a college professor. I wanted to study supply chain, because I was just so fascinated by it all at that time. I got involved in studying logistics and operations.

Then, supply chains weren't nearly as interesting as they are right now, because everything was working so nicely. We weren't importing quite so much stuff from Asia at the time. Things were just starting to ramp up.

Then, over time, time passes, and about a year-and-a-half ago, we started talking -- it was actually pre-pandemic, so it must've been maybe three years ago now, two years ago -- we started talking about teaching a supply chain course as a part of our MBA at the University of Maine. I was just sort of a natural fit to teach it because I had so much supply chain experience in the real world.

However, once I immersed myself in learning [laughs] everything about supply chain that I could, I realized, "Wow, things have changed so much." I just find it so fascinating. Ships are interesting to me, and moving stuff is so cool. How it gets wherever it's going, from point A to point B, is just fascinating. Who wouldn't love all of that stuff! It's so cool. [laughs]

Ron: That's great that you're into it like that.

Patti: I'm so into it. [laughs]

Ron: Has this latest situation exposed some underlying problems? How good is the United States compared to the big ports in the rest of the world?

Patti: You've probably heard on the news, other countries...China comes to mind. They've invested so much into their port infrastructure in China, because they ship so much stuff out. We don't invest like that in the US. Furthermore, we have quite an incentive to keep our inventory levels low.

As a matter of fact, total quality management came into favor in the '80s, roughly. It had clear benefits for manufacturers. If we use total quality, which includes just-in-time, then manufacturing plants, right down to the local bike shops, are encouraging people to,

“Don’t keep your supply in your store. Keep it in the supply chain, because this is going to be so much cheaper for you.”

Over time, people did this. Now what they’re saying, “Wow, well, is this really the way we should do this? Maybe we need to keep a little bit more safety stock on hand.” As you know, the more capacity you have, the more money it costs to hold the stuff.

In order for firms to be competitive, they have to keep their costs way down. One way to do it is to keep the supply in the supply chain. Now when there’s a problem, then it’s a problem for everybody.

It might seem like it would be better to keep more safety stock in the place, wherever it is, your distribution center or your manufacturing plant or whatever, but profits will not go up when you do that. Because we tend to have a short-term outlook on things, it’s a little bit harder to get the bottom-line to be higher when you’re holding more inventory than you ever had.

I don’t know, but I do know also that shipping companies are raking in the profits right now. Maersk, which is the biggest shipping company out there -- it’s a Danish company -- it has recorded profits in the third quarter, higher than in the last 117 years, having a profit of \$5.9 billion.

What is interesting about that to me is, not necessarily that their profits are big. We know they’re big because they’re charging more. They used to charge \$2,000 to ship a container. Now they’re charging \$25,000 to ship a container.

What’s fascinating about this to me is that, in quarter three of 2020, Maersk shipped 3,283 million TEUs. 3,283 million TEUs in 2020. In quarter three of 2021, Maersk shipped just about the same amount -- a little tiny bit less, about 20,000 TEUs less -- but they earned 89 percent more total revenue than they did in that other quarter they were comparing it to.

They’re shipping the same amount of product, but they’re earning 89 percent more revenue, which equates to that \$5.9 billion increase, which is the biggest profit that they have, all total. If they total up all the years they’ve been in business, this is more profit than they’ve ever made.

Keeping the supplies in the supply chain may not be as profitable as it once was. However, that’s what we’re doing in businesses.

Ron: For every action, there is certainly a reaction. Maybe one of those is production of goods at home. Is that a good idea? Is that a trend we’ll see, people will buy local more?

Patti: It seems to me that buying local is the best option for Christmas of 2021. [laughs] Buying local is always a good idea. We don’t always think about the footprint of our Apple

Watch. I've read that our Apple Watch has already traveled some 200,000 miles by the time it even gets to our pocket, or our Apple Phone or Watch or whatever, because the supply chains are so complex.

Buying local is always a good idea, in my opinion. If the more local we buy, then we reduce our dependence on the broader supply chain. By purchasing our goods and services locally, we avoid our own personal dependency on the supply chain, which seems to me like it'd be a good thing.

None of us can change the world, but each of us can change our little part of the world. It seems to me that we all might consider this. As well, we could spend a little less. We do get a lot of stuff from Asia that we may not need.

I was thinking about this, and I thought, if we spent a little bit less, and instead, enjoyed the company of our friends and family a little bit more, that might be a better way to spend our time. Of course, it's not my area of expertise.

It seems to me that spending more time with our loved ones, rather than money on them, would cut down on waste and increase everybody's happiness. I don't see how that could be anything but a good thing.

Ron: That would be great if that happened. Not to put you on the spot here, but do you think most people would get what they want for Christmas? Will this situation resolve itself in weeks, months? When do we get back to "normal," if that's even possible?

Patti: I don't think it will be back to normal, certainly not by Christmas. I suspect it will take at least a year to start to work itself out. Our spending, in the US, typically goes up this quarter of the year, because we spend more around the holidays. I don't see it working itself out.

If we were having this conversation a year from now, we might be talking about slightly different things. I suspect, some of the things will still be there. It's just a mess.

Things like having chassis and containers down in South America that we don't normally have them there, and we've got to go get them all picked up and get them back to where they need to be, there's just so many oddities that occurred with the pandemic.

Stopping production, and starting production, and then shipping stuff to places we don't normally ship to, and then not picking up the containers, it's going to take a while to get it all work out.

As for whether or not we'll get everything we want for Christmas, it depends on what we want. If we want to spend time together, this is a great time to do it. If we want some unique new toy produced in China, that might be a little harder to get.

Ron: Speaking of the pandemic, obviously that has caused major shifts in what people do and what they buy. Home improvement's probably up, travel is down, that kind of thing. You think these trends will stick and ripple through the supply chain, and upset things even further, possibly?

Patti: The pandemic forced our hand. What we're doing now with Zoom, I'm pretty certain that if you would've asked me to do this two years ago, I would've never entertained the idea of doing this by Zoom. We would be together, in an office.

Now, zoom is so commonplace that I suspect the workplace will change, because companies don't need to spend big dollars to own big buildings when they can have their workforce dispersed. It's not true for all industries, but many.

If the workplace changes, a lot of the spending that we see, the increase in spending in furniture and wood is, we're up -- hang on a sec -- 36 percent, in spending on those type of things, I suspect that's not going to go away. You don't have to commute anymore. If nothing else, you save yourself an hour a day, and in some cities, probably two or three hours.

I don't know, I suspect the environment that we live in will be different. I can't know what it will be, but I don't think it's going to just go back to pre-pandemic, the way we did things.

Ron: If you looked out 10 years, what do you think we'll see? Are we going to have everything, our pizzas delivered by drones or robots? Where are we headed with all this? Hopefully, these problems will have been solved, but what does that look like as you look out into the future?

Patti: Don't you think that we have to look at the carbon footprint that all of that stuff makes? To me, that's a really important thing. Personally, I don't think I want drones delivering my stuff [laughs] from Amazon, just because the carbon footprint is just going to be too large.

It's very difficult to isolate how, having all this stuff delivered from Amazon or other big carriers, using FedEx and UPS, how that has shifted consumption of fuel, and how that's affected our carbon footprint. My guess would be, it has to have gone up. In 10 years, I don't know. [laughs] I can't imagine.

[background music]

Ron: If you knew, you would be a multi-billionaire at this point, probably.

Patti: Probably wouldn't be sitting in Orono, Maine, if I knew the answer to that. I do think that this pandemic has been a really good eyeopener for all of us, to reconsider what is important, and what we do, and how we spend our time.

Ron: Fascinating stuff. Thanks so much for taking the time to talk to us about it.

Patti: Yes, my pleasure.

Ron: You can find The Maine Question on Apple and Google Podcasts, Spotify, Stitcher, and SoundCloud, UMaine's Facebook and YouTube pages, as well as Amazon Music and Audible. Send along your questions or comments to mainequestion@maine.edu.

This is Ron Lisnet. We'll catch you next time on The Maine Question.

The University of Maine in Orono is the flagship campus of the University of Maine System, where efforts toward racial equity are ongoing, as is the commitment to facing a complicated and not always just institutional history. The University recognizes that it is located on Marsh Island in the homeland of the Penobscot nation, where issues of water and its territorial rights, and encroachment upon sacred sites, are ongoing. Penobscot homeland is connected to the other Wabanaki Tribal Nations — the Passamaquoddy, Maliseet, and Micmac — through kinship, alliances, and diplomacy. The university also recognizes that the Penobscot Nation and the other Wabanaki Tribal Nations are distinct, sovereign, legal and political entities with their own powers of self-governance and self-determination.