The Future of Supply Chain – Episode 151: The importance of data with Maria Clara Sayeg Ribeiro

Maria: [00:00:00] I think Richard, that supply chains will function more like a neural systems than a pipeline. They will sense changes in customer preference, disruptions in raw material availability, yield variations in production, and they will adapt autonomously within boundaries that human set right. So the humans will not need to manage the day-to-day flow anymore. They will be like the driver, the centers, managing exceptions and setting these strategic constraints. When to push, when to conserve, when conditions demand a completely different approach while the system will handle all the millions of micro decisions anonymously.

Richard: My name's Richard Howells and this is The Future of Supply Chain, a podcast where we discuss hot topics, best practices, and the latest innovation in today's global business. And I'm joined by my wonderful co-host Sin.

Sin: Hello everyone, my name is Sin To and I'm Richard's [00:01:00] partner in crime on today's podcast episode where we want to discuss one of the most talked about topics data and AI. Today we have the privilege of welcoming a true expert in this space Maria Clara Sayeg. So welcome Maria, and to kick us off, could you please tell us a little about yourself and your role at the World Economic Forum?

Maria: Sure Sin, thank you so much for having me you and Richard. It's truly a pleasure. So, I'm Maria Clara. I currently lead data and AI at the World Economic's Forum in the Center for Advanced Manufacturing and Supply Chain.

And over the past few months, I have been building something called Lumina which is essentially an AI powered platform that helps manufacturing and supply chain leaders to understand what's actually working in industry transformation today. We now have over 5,000 users already from almost 200 organizations globally.

And what makes this truly interesting is that this is not only theory, it's real implementations with real [00:02:00] impact data that we are seeing coming from our initiative called the Global Lighthouse Network, which is a network of

the world's most advanced facility. So I'm more than happy to share what are the trends that we are seeing on that space with us today.

Sin: Oh, that's cool. I'm eager to learn and to hear more about that. So when we look at the major global trends at the World Economic Forum in Davos, which just ended, it sends a strong signal, AI and data were among the topics on the agenda. With that in mind, how do you see the role of AI and data analytics specifically in the context of modern digital supply chains?

Maria: No that's really perfect timing Sin. So, we just came out of the annual meeting a few weeks ago, and AI was absolutely dominating all the conversations. One of the things that really struck to me in one of the sessions "The factory that think" for example, was how much the discussion from last year to this year has shifted from "we should do AI to here's [00:03:00] exactly what we are getting from it."

And the numbers are honestly really impressive. So when we look into these Lighthouse data that tracks over a 1, 200 transformation cases, supply chain implementations are delivering 67% average reduction in inventory levels and 45% compression in lead times. And these are not projections, these are measured results from companies that have deployed the solutions and tracked them for at least a year.

But for me, what I think most people are still missing is the business cases with the greatest potentials are not about building a massive AI brain, right? That optimizes your entire supply chain end to end, because one, this is technically impossible and unrealistic.

And instead, what we are actually seeing work is companies instrumenting their different handoff points. For example, connection between production and distribution, or between the supplier [00:04:00] delivery with the manufacturing and using AI to create a real time feedback loop in those critical junctions.

And here I had the chance to visit a few factors in China last November. And one of the greatest examples that software manufacturer there, they deployed IOT sensors across their entire logistics network. They integrated that with their production scheduling system, and now their factors actually adjust the output based on real time inventory levels across the all their distribution centers.

And this is cutting again, the reaction time demands by 65% which essentially means that now they're carrying less safety stock while maintaining very high service levels. So the value creation really comes from the combination of

visibility plus the ability to act on what you are seeing. And to be honest with this really requires data infrastructure first, then the analytics, and then the AI. And in my [00:05:00] view you really cannot skip those steps.

Richard: You made a really important point there of you've gotta have the right data before you can start leveraging any tools, because whatever data you have, that's the foundation for all of the answers that the tools given they're not gonna give right answers, but the wrong data.

The other thing that's really interesting that I'm looking forward to in this conversation is the fact that the World Economic Forum have this global Lighthouse network, and I've been following those companies for several years. I'd love to learn the best practices because everyone listening here may not be a lighthouse customer. So how can every company leverage data and AI to sustainably strengthen the resilience of their company and the agility to actually act on the decisions across their supply chain?

Maria: That's a really good question, Richard, and this is really interesting because I think that this phrase that we are seeing all around presentations right at the end to end [00:06:00] optimization, they truly sound great, but what it is actually the wrong way to think about this.

And I will tell you why when we analyze that over 300 use cases in our data what we started to understand that this is actually not end to end optimization and actually more end to end synchronization. So this means that the organizations, they're not optimizing everything simultaneously. They're creating what I would call an intelligent constraint management, where the system identifies where your bottleneck is today, you address it and tomorrow when the bottleneck moves somewhere else, the system tells you "hey, this is why it moved", right?

So we recently published a white paper on manufacturing resilience and one of the key findings was that resilience does not come from having backup plans for everything. It comes from being able to see disruptions as they're forming and responding before they create major problems. Right?

And the key [00:07:00] levers are actually pretty straightforward. So again, going back to that data analogy, right? First is the data collection and availability, which shows up as a requirement in 85% of all the implementations that we saw. And I mean real time data, right from the operations and not monthly reports or dashboards. Secondly is cross-platform interoperability,

which is just a fancy way of saying your systems can actually talk to each other, and this is a true problem in manufacturing today.

And finally, the third would be integrating the data into your production control. So decisions can be made quickly. Think about how you learn that you recognize on your commute to the work, when traffic was about to get bad on your commute. So first you had no idea right? On the first few days, but after a few months of driving exactly the same route to your work, you start noticing some patterns. When you see brake lights at a certain point or when it's raining or when there's construction, you instinctively know [00:08:00] okay, I should take another path. You are not predicting the traffic as ways, right, mathematically, but you are pattern matching based on accumulated experience that you have.

And that's essentially what AI is doing in supply chain, but at a massive scale and speed. So first, if you are able to install instrument or entire operations, think about installing cameras on average stretch of the highway, so you can see what's actually happening. Then you'll feed historical data into machine learning models that learn what normal look like and what patterns preceded those problems. Third, the AI monitoring all this live data. And fourth and finally, and this is crucial, humans need to make the decision about what to do with that alert, at least initially. And then the AI will learn from the decisions that work it or not. I know it sounds scary but the magic is not that AI is smarter than humans, is that it can monitor thousands of variables at the same time. [00:09:00] Never gets tired. Never gets distracted while you humans, we do bring sometimes judgment and context that AI does not have.

And if you allow me to share maybe another use case that I saw in the industry. There's this pharmaceutical manufacturing in our network that deployed sensors across their entire operation, production lines, warehouses, distribution trucks. And their AI does not try to optimize things, it just identifies where the constraint is at any given moment. So maybe yesterday was quality variance on the line two, today is the warehouse staging capacity. Tomorrow it might be track availability and the system will shift to resources based on where the problem is right now. So they achieved about 1.5 times improvement in their supply chain responsiveness and the reason that is, this works, is because they're not trying to predict what can go wrong and they're actually understanding what is really good in responding [00:10:00] faster than the others.

Sin: Right. And that as you just mentioned, transparency and also resilience and efficiency. And that brings actually me to the next question is what is the role of transparency and traceability supported by AI and data platforms for more

sustainable supply chain, including in terms of new regulatory requirements and how do companies and consumers actually benefit from this? So based on what you just said, like monitoring everything in real time, this is traceability and real time data per se.

Maria: Okay, so thank you so much, Sin. And this is true. What we are seeing in the data is that transparency alone does not drive sustainability improvements. What is really driving sustainability improvements is process redesign and the transparency is what makes that redesign actually stick over time.

So, let me give you a concrete [00:11:00] example from our network. So, the highest performance sustainability case we have in our entire network achieved the three times improvement. And it was through a circular refrigerant management where they instrumented every valve, every connection point, every storage tank should detect leaks in real time.

So, that transparency revealed that 40% of the losses was happening during maintenance procedures, which was a process problem and not a technology problem. So, they redesigned it how maintenance teams handled the entire value chain and the data platform kept enforcing the new processes through automated alerts whenever someone was deviating from it.

And I think that for regulatory compliance, especially around scope one, scope two, scope three emissions these traceability platforms are becoming super critical. Nowadays you have to have that. But what is interesting is that the business case, again, it's not really [00:12:00] about compliance, it's about the operational improvements that can come with it.

So we are seeing waste volume reductions averaging 27%, water consumptions dropping 41% at the same time that the productivity is also increasing across the implementations. And this is translating directly to cost reductions and not just better sustainability regulatory reports.

Richard: I love the examples you're giving because you are talking about certain levers coming down whilst others are going up, and that balancing act is usually an either or in many indices. But once you've got all of that data in the right place and can make those decisions, you can benefit on both sides. I wanted to go back to data though, because data is complicated and getting data is complicated. Many companies face the challenge of consolidating data from different sources.

We have an SAP business system, for example, but there may also be legacy systems. There's structured data, but there may also [00:13:00] be unstructured data. So what best practices or initiatives do you see for successful data integration and getting that source data right at all times?

Maria: Richard, this truly is very close to my heart. I spent almost 10 years in consulting doing exactly this exercise of integrating data from one system to the other in a very short period of time. And again, those systems, they were not designed to talk to each other. So, and this is the question that every manufacturing company is wrestling with. Because everyone has some version of this problem. Maybe you got the SAP that is running for 20 years with custom modifications that nobody knows anymore in the company, you got your MS systems from three different vendors depending on which factory you are in. You got the IOT devices now that generates a lot of sensor data and somehow with this new [00:14:00] AI boom you are supposed to integrate all of this into one data platform. And it sounds impossible, right? And honestly, if you try to integrate everything, it is going to be Impossible.

So to your point, what are the best practice that we see repeatedly in those successful implementations is to not try to integrate everything and instead focus on the 20% of the data that will drive 80% of your decisions, right? So for most manufacturers, that's production volumes, quality defects, downtime events, maybe inventory levels. So five data types. And if you can get those flowing in real time from your source systems into a unified layer, and here you can definitely use AI on the taxonomy levels, you solve with probably 70% of your analytical needs.

The approach that works is deploying a middleware that extracts data from legacy systems without [00:15:00] modifying them. Because the moment you start modifying again, your 20-year-old SAP configurations, you break things in unpredictable ways. You use the standard APIs where they exist. You build custom connectors where they don't, and then you create what's called a semantic layer on the top that will translate to the fact that SAP call something finished goods, and maybe another system calls FG complete. And then you translate everything into a common language which not only your analytical tools, but also your people can understand.

So there's these electronics manufacturing that we visited that took 14 months to integrate seven systems. But the smart thing that they did was to generate measurable impact at each month by starting just with the quality data, getting that clean, reliable, building some analytics on one single domain and then

expanding. So this sequential integration I think that a [00:16:00] bits trying to do everything simultaneously, every single time.

Sin: So when we take data integration one step further, we quickly move beyond the boundaries of individual companies, right? So the World Economic Forum also highlights how critical collaboration across the entire value chain also supply chain has become. And that brings me actually to the next question how does technology foster across industry collaboration and open knowledge sharing?

Maria: This for me, is actually one of the most powerful things that a neutral convener such as the Forum can play a role, right? And one of the most interesting aspects of this Lighthouse Network, because you have 223 sites across automotive, pharmaceutical, consumer goods, electronics, processing industries.

And these are often direct competitors to be very honest. Yet they're sharing implementation playbooks, they're trying to come up with like operating systems, impact [00:17:00] data, and even lessons from failures which in any other traditional competitive dynamic would never happen. So, we discussed this quite a bit in some previous events in the context of how open innovation is also becoming essential for tackling complex challenges that are bigger than any single company, in terms of supply chain, in terms of technology.

But let me be clear about what sharing here also means because it's not only about some idealistic collaboration story where everyone holds hands together and share their trade secrets. These companies are sharing architectural patterns, the sequence they follow, the capabilities they built first, where they failed, where they had to backtrack which technologies they combined. We are seeing a lot of technology convergence there as well so which best technologies combine the drives more impact. So again, they're not sharing proprietary algorithms or competitive strategies. They're sharing the [00:18:00] enablers, the capabilities, what they made first and what makes this work is that we are structuring everything into a common taxonomy or a common playbook where other organizations can also benefit.

What is the problem solved? Which solution was deployed that the technologies there, that was use it. And this standardization is what enables, going back to the analogy on the traffic pattern recognition, right, at scale. So we can say with statistical confidence, things like if you are deploying a quality process improvement in the automotive industry, here are 47 other use cases. Here is what this looks like. Here is the average impact. And that knowledge is

something that is generally valuable because it helps companies avoid the most common pitfalls and set realistic expectations.

So, I truly believe that this next the future of manufacturing relies not only on collaborating amongst the value chain, but also sharing the best practices. And [00:19:00] this better recognition amongst the ecosystem.

Sin: A follow up question on this. So, can I, or can we take this as a kind of playbook or thought leadership document or something like this where companies can go and look after what other companies had been done as you just described?

Maria: Yes. So the Forum has three different initiatives where you can look into that. So, the Global Lighthouse Network, the ones that I have been sharing is a repository of over a thousand transformation use cases.

Then we have the Lighthouse Operating System that is a consolidation of all the best practices and our idea is how can we create a framework that helps the industries, SMEs, governments should driving this transformation and all this data is consolidated in our platform, our AI enabled platform called Lumina, where organizations can come and understand statistical trends, technologies that are being [00:20:00] converged together and so on.

Richard: If the last twenties or plus minutes hasn't taught me anything it's that there is so much change going on in the manufacturing world today and supply chains in general, and that change is only getting quicker and quicker as the clock speed of business speeds up.

So with that in mind, I want to see how things are gonna change even more so in the future and look forward with a forward looking prediction. So what developments in AI, in data and in technology will shape manufacturing companies on their supply chains in the next five to 10 years? What are the challenges and what are the biggest opportunities for companies to transform and how can they start?

Maria: That's a very great question, Richard and I like it that you phrase this as the opportunities and the challenges. I'm seeing two shifts that I think that will define the manufacturing of the [00:21:00] future.

So, first we are seeing that talent and customer centricity is emerging as categories separate from pure productivity, which is signaling that manufacturing is transitioning from how do we make things cheaper, faster to

how do we make things customer actually want with a workforce that can evolve as quickly as our technology, right? It became a talent issue nowadays, and one of the things that I have been seeing is how can we make manufacturing and supply chain cool again, right? It was a very cool job a few years ago, and now there's this big shift towards technology. And that's a fundamental shift that we are seeing.

And second, and this came a lot in "The factories that think" session at Davos, right? The revenue impact numbers are starting to outpace cost reduction as the value driver.

So we are tracking revenue improvements averaging 80% across transformations. [00:22:00] Product improvement delivering a hundred percent average impact, which means that by 2030 manufacturers and supply chains that win will not necessarily be the most efficient ones, but they will be the most adaptive. Able to reconfigure the entire production for mass customization that the customers are need without cost penalties, able to launch new products at a high speed because their data platforms compressed the time to market. They're able to adapt their entire value chain based on new regulations, trade and tariffs that are coming.

But going more specifically right, in terms of the technology developments that you highlighted, I think three things are going to be huge. The first one is autonomous production systems that self optimize without human intervention. So, we are already seeing early examples achieving almost two times improvement in lights out manufacturing environments.

Second [00:23:00] is circular resource that flows generally and redesigning business models around reuse rather than just adding recycling at the end, right? So, putting the circularity at the center and our data shows this is actually very profitable and it's not just good PR.

And third, again, going back to the workforce. Is the human augmentation through again AR, AI that multiplies workforce capability. And these, we are seeing engagement improvements, compressing training times which matters a lot. And again, as we think about this workforce transformation, right? We're seeing the baby boomers retire and now we do have this need to upskill younger workers really fast.

So I'm a mechatronics engineer. I graduated a little bit over 10 years ago and 10 years ago a job in the manufacturing and supply chain plant was not cool, right. And nowadays we are seeing this shifting towards actually [00:24:00]

manufacturers nowadays, they are the new tech companies. If you visit like some facilities from the most advanced manufacturers. It's really cool, I'm not gonna lie.

Richard: Mary Clara, this has been such a great conversation, but I'm now gonna ask you the most difficult question of the whole thing because I'm gonna ask you to summarize in a few sentences what we've talked about for the last 25 minutes. So, from a data and AI perspective, what's the future of supply chain?

Maria: Wow. I think Richard, that supply chains will function more like a neural systems than a pipeline. They will sense changes in customer preference, disruptions in raw material availability, yield variations in production, and they will adapt autonomously within boundaries that human set, right.

I'm Brazilian and I am a huge fan of Formula One, and I'm a huge fan of Ayrton Senna, was a Brazilian [00:25:00] driver back then and he was one of the greatest. But he was not just executing a predetermined race's strategy, right. He was reading the race in real time, sensing when his tires were losing grip, feeling changes in the car's balance, seeing opportunities opening up ahead and making split second decisions that his team supported, right?

So, it was a combination of the car, the driver, the pit crew, the strategists. They were all connected in one system, operating of the same information, adapting continuously to changing conditions. And Ayrton Senna, by the way, he was the best during the rain. Every time there was raining in Brazil, we were celebrating we knew that he would win.

And for me, that's what the future of supply chains will look like, right? So the humans will not need to manage the day-to-day flow anymore. They will be like the driver, the centers, managing exceptions and setting these strategic constraints. When to push, when to conserve, [00:26:00] when conditions demand a completely different approach while the system will handle all the millions of micro decisions anonymously.

But one last thing about Senna that people often forget. His brilliance on race day came from obsessive preparation. Thousands of hours of practice, understanding every technical detail of the car, building the memory so he could react without thinking. And the exciting part was the race, right? But the foundation to race was building the boring, repetitive work that nobody was seeing before.

So, for me that's the reality check. And we emphasized this in our new white paper on smart manufacturing that the future requires solving the boring infrastructure problems today. I know that AI is the buzz world. But if you do not solve the intelligent infrastructure on both levels, right, on the company, but also on the cities. It is going to be a problem. And around [00:27:00] 80% of our use cases that requires data collection and availability as a foundation. So again, it's an unglamorous work that no one sees but it's just like a race car driver perfect instincts, but a purely prepared car.

Richard: Exactly. I it goes back to that if you don't have the right data, you don't get the right answers. Yes. And that's the first time that we've had Formula One come into the answer to what's the future of supply chain, which is pretty cool.

Maria: That's nice. Lots of cars analogies. That's when you know that I'm a proper mechanical mechatronics engineer from Brazil.

Richard: So, Maria Clara. That was great. Thank you very much. Such a, such an interesting conversation. Really enjoyed it.

Maria: Thank you, Richard. Thank you Sin for the opportunity and looking forward to staying connected.

Richard: And thanks everyone for listening. Please mark us as a favorite. You can get regular updates and information about future episodes. I will be sure to include lots of links to the World [00:28:00] Economic Forum as well for some of that great data that Maria Clara was talking about. But until next time, from Maria Clara, Sin and I, thanks for discussing the future of Supply Chain.