Episode 145: Automotive Supply Chains: the Secrets of Electric Vehicle Battery Supply Chains with SAP's Hagen Heubach

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Supply chain will be one of the crucial factors for automotive also in the future. Car makers have become resilience on demand, I call it, because at the end of the day, they are facing this crisis day in, day out.

Richard: I'm Richard Howells and this is The Future of Supply Chain. A podcast where we discuss hot topics, best practices, and the latest innovations in today's global business. And as ever, I'm joined by my wonderful co-host Oyku.

Oyku: Hello everyone. I'm Oyku Ilgar, a marketer, blogger, and podcaster in the supply chain and ERP area at SAP. In today's episode, we'll explore battery management within the automotive industry, covering the full lifecycle from sourcing raw materials and manufacturing to in-vehicle management, [00:01:00] repurposing, recycling challenges and trends.

And today, so we are joined by SAP's Hagen Heubach. Hagen, it's a great pleasure to have you here today. Let's kick things up with a quick introduction from you.

Hagen: Wonderful. Hello Oyku. Hello, Richard. Thanks for having me. Looking forward for an exciting podcast session with you.

Oyku: Likewise. So Hagen, geopolitical tensions, trade disruptions, unfair labor practices, the EV battery supply chain is vulnerable to disruptions due to concentrated sourcing of materials, minerals, and heavy reliance on few key suppliers, especially in China. So how are automakers strategically addressing this geopolitical and supply risks to ensure continuity and resilience?

Hagen: So super questions actually to open and addressing the big elephant in the room, right? Me being actually a kid of the automotive industry and supply chain, I mean doing this for more than 20 years in all the different facets. It's clearly that we see that the automotive industry is under a [00:02:00] massive transformation, right, either way. That's what we know from the beginning, the whole shift from. Classical combustion engines, two EVs, the middle step with hybrid, it makes it more and more complex for car manufacturer, either way to lift and shift their entire supply and value chain. And on top of it, all the outside factors, which are impacting a lot of producing or discrete manufacturing companies all across the world are facing the similar challenges what you just listed on. So trade impacts, political tensions, raw material shortages. That's the daily life of the car makers, right? And if you look for example just into the recent newspapers. That's actually the three, four weeks ago here in Germany, we had the big impact for semiconductor crisis once again.

And if you look to, especially this where you have chip producers with the main chip producers obviously are coming from another [00:03:00] continent and other regions, big car manufacturers from Europe, from the US, but also from Japan are struggling to balance it out. So, what could be a best strategy around that one?

So first of all, car makers have become resilience on demand, I call it, right? Because at the end of the day, they are facing this crisis day in, day out. And it was almost like four or five years ago, and I still remember the first hits of COVID when we were sitting here in Waldorf at the SAP headquarters together with a couple of the CEOs from German car manufacturers, and they asked us.

Hey, how, what can we do from a IT perspective to raise visibility, to become more resilient, to react faster, maybe on this impacts and the volatility on raw material shortages. They just came to us and said, it's just really obvious that IT and technology can help here. A, because getting the data [00:04:00] from an entire value chain, that's still a big challenge or was a big challenge at this time for car manufacturers, but at the same time, also get the right conclusions how to react on these impacts in the right way. This was quite obvious that tech and especially also AI simulations can help here a lot, right? So if you ask me around where German or global car manufacturers are these days, of course, they're still fully threatened and they're fully under fire on all these impacts happening.

Why? Because yes, automotive value in supply chains, they're super complex, they're also very detailed and tied on processes like just-in-time, just-in-sequence. It's not like that. We have a lot of flexibility and a lot of overhead

stocks in the automotive world, so that's why we need to react as much as possible at scale at any time, and tech can definitely help here.

Richard: That's a great setup for this [00:05:00] conversation. And you've got somebody who's really interested in me and I've just bought my first electric vehicle. So a lot of these questions are quite personal to me as well. I'm finding out how this product actually came to being and is manufactured and I want to start in the production and assembly area.

And ask how are manufacturers optimizing the location and logistics of battery pack assembly to balance everything? And supply chain is a huge balancing act, balancing costs, balancing efficiency, including sustainability, supply chain, security, and of course our favorite topic of last year tariffs. So how are they balancing all of these challenges?

Hagen: I mean, So first of all Richard it's a great example of saying we see clearly a shift to EV right? And the future of automotive clearly will be electrical. However, for especially a lot of the well established installed base car manufacturers, it's still a transition and classical combustion engine and also hybrids are still a huge huge business and a step in there.

So first thing, [00:06:00] what we see. And especially for the high volume car manufacturers, they're adding clearly complexity to their manufacturing and production and also their warehouse processes. Why, if you look to the big ones like BMW, GM, Toyota, also at the same time. They have the desire of saying a full fledged car manufacturing and assembly plant needs to be able to manufacturing actually everything on one assembly line, classical, combustion, hybrid, and EV, right?

And now you could actually say, Ooh, this is now getting really complex. But honestly, we see that all around the world that car manufacturers are tackling and getting it done. Why? Because if you look at automotive manufacturing, of course, it was always one of the most complex ones with just in time, just in sequence, kanban model mix, planning sequence, even very end configuration where at the last time you still can switch maybe the color of a car or whatever this was always complex. And now adding actually a whole new system for electric vehicles, [00:07:00] of course it raises to complex, but. We have the platforms, processes, people to actually do that and also adjust into the right way.

So that's number one. Yes, complexity is raising, but it's definitely doable. Number two the whole area of battery manufacturing, which is nothing else as

the core component of the cards of the future maybe besides of the software platform. It's the number one and the biggest changing also actually in the entire value in supply chain processes for car manufacturers. Why? Because on the one hand side you could always say yes processes and a lso the dimension of complexity is reducing. Why? Because we're pushing down actually the number of components in a car from 2000 to 250 with a battery. So all the different parts, what you need together, bring together in time, in sequence are getting less, right?

Because we have a battery. However, other complexities are adding [00:08:00] up. Safety and compliance and regulations for batteries are way, way higher, combined with some really. There are funny insights you also need to learn, and this is hands-on experience now . We had a customer, for example, here, one of the European high volume manufacturers when they started the ramp up and the start of production for their new EV lines they had immediately after the first new vehicles run off the assembly line battery performance issues. And the reason for that was they have the fully assembled battery packs and the modules stored for two weeks actually in their warehouses next to the assembly plant. And guess what? No one recharged these batteries. So immediately you had a shift and a drop in battery performance and battery power from the beginning, from a fully new car, right? So, which means then at the end, yes good insights. Quality maintenance processes need to be in place. And guess what? You need an IT system also to maintain that afterwards.[00:09:00]

So look, this is just all a bit of a lessons learned, how to get this in line and tackle this, right? And the last thing, obviously, what is also highly connected now with the complexities of saying how do I get resilient? How do I get resilient in shifting capacities, components from A to B at scale?

So the times where we have big car manufacturers who are relying maybe only on one battery manufacturers or one sourcing region, these are long gone. The diversity of the supply chain management network is increasing. And the interoperability of suppliers were said, yes, I need to be able to shift components from supplier E to supplier B, from region A to region B. This is definitely happening and it's definitely increasing. And also one thing here simplicity of EV helps. That's quite clear, right? Because it's a different game. If I only have. The 250 [00:10:00] components in the battery versus the 2000 sub components which I need to source all across the world, right?

So it's quite obvious that there are yes challenges, but also opportunities along the way, especially in production and assembly.

Richard: You mentioned managing the complexity and being more resilient. And an important decision for managing those things is whether you are a vertically integrated process versus all of the outsourcing that you mentioned with multiple suppliers, outsourcers, et cetera. And that's a major decision for most OEMs. So what are the most significant advantages and drawbacks of each approach when it comes to battery production and management?

Hagen: I mean both, right? It's a fundamental question of each car manufacturer these days. What do I own? What I do control and what is also my differentiation in the market of car manufacturing. Because let's be very honest here. [00:11:00] The way the whole market is disrupting itself is dramatically, right? Who would've thought of, and that's the beauty, right? Also, a bit of us seeing it from an IT side that companies who were even not in as a single business unit in the area of automotive now producing full fledged EVs. Example, Xiaomi, for example, from zero to 100, producing a high-end EV on a luxury brand cases.

New car manufacturer, for example, the first car manufacturer from Vietnam with wind fast, right? Never thought about that we have a full fledged production and a EV car brand from Vietnam. Now these days, this brings a lot of opportunities in there. However, and this is now the challenge also for the installed base in high volume car manufacturers like the Toyotas, the GMs, the Fords, the Mercedes of these worlds of saying so what's our differentiation factor now in this market? You could [00:12:00] always argue, hey, the big installed base car manufacturers have a big ego and said, hey, I want to control everything or as much as possible, actually, also from the value chain below, right? Because the gearbox, the powertrains, they were really specs coming also from the big car manufacturers by itself. But at the end of the day, let's be also clear manufacturing battery or battery modules, much more easier, much more simpler, and also a different angle of the business. There is a reason why ACATL, for example, is still one of the biggest battery manufacturers and not even closely actually to the car manufacturing by itself tied off.

The only one who is really combine it and controls a lot of the value chain by itself is BYD, right? BYD with a big car manufacturing plant brand, but also the sub-components of the battery by itself. If you would ask me and what we see currently on the entire market. It's almost like for [00:13:00] car manufacturers, the battleground does not lie on the battery side.

Yes, it's a super, super big component and it's very valuable, but at the end of the day, it will become commodity. The real battleground in automotive and

where you really have the market differentiation is not on the battery and the supply chain of the components. It's actually the Incar software piece, right?

And you know, now this is actually the point where an end customer, like you have the right experience at the right time. Your entire digital twin profile of a car, how to manage, how to evolve also a car into a state of autonomous driving. This is really the next battleground where more and more of our manufacturers are reinvesting.

So if you would ask us, it's more like a shift of priorities on saying, yes, of course we need to have control and access to the supply chain and control also large parts of the battery value chain. But the real battleground lies somewhere else, and it lies clearly in the in-car [00:14:00] software and the autonomous driving vehicle system.

Oyku: Maybe we can talk a little bit about the concept of zero life reliability and maybe you can also explain how does this concept shape quality assurance and lifecycle management before a battery is even put into service.

Hagen: It's a wonderful example and coming back to this example, what I tested before, because zero life reliability is nothing else than. You know, It splits into several components. A pre-operational assessment, which means analyzing the battery health even before the first car is produced, right?

So you need to do clearly your homework. You cannot say, Hey a powertrain is assembled and quality tested, and now for the next six months, we can leave it on the shelf and then just put it into a car for a battery. Never happens. You need to have continuous checks and quality pre-operational assessment gates and this quality gates for battery are pretty high, right? So how to load balancing, how to actually [00:15:00] get the right performance at the right time out of these batteries. It's incredibly complex. And second you need to come up with a much, much more data driven approach. How to actually apply the future performance of a car. But you know, we had these situations, especially now here in Europe, when you have the first big winter periods in here and, for our areas here, having the low temperatures is not not so common anymore. We see battery performances drop dramatically already and having statistical process controls or statistical process predictions for batteries in place, it's absolutely necessary, right? And this also brings a lot of I would say, mentality of this holistic battery management end to end. This is why something where we always also promote from an IT perspective, you need to think about the battery management holistically from the raw material to the recycling, the battery needs to be managed, end-to-end. And it's even furthermore that we say, Hey,

end-to-end battery management doesn't [00:16:00] end at the end of the lifetime of vehicle, the second life of a battery. And always think about it, if the first batteries are going out now from the automotive market, they still run with 60 to 70% capacity. Which means there's a huge opportunity here also for the second life. Maybe not in a car, but in some other components or end products in here, right? So, yeah, zero life pre assessment super important, but you need to watch the entire end-to-end life cycle. It's really important.

Richard: Just a follow on from that, where are you seeing the batteries being used in their second life?

Hagen: We had different ones. You remember we had the super good engagements with companies like Dyson, who had the dream of first are going into vehicles, second into electrical Hoovers. It's a big one for sure. Industrial manufacturing, industrial machines. It also, even heavy equipment construction, for example.

It's not that the batteries need to be that reliable and that high performance. For example, as for [00:17:00] cars, because you have way less electronic control systems still very well maybe to run a construction machine, or a crane, or a land machine or something. So you still have a slight connection actually to automotive, but not on the passenger side.

It's more on the heavy equipment side. So the spectrum is quite broad here, what we can use.

Richard: It seems like there's a whole new market for future business in that space. I wanted to go back to some of the things you mentioned a little earlier, because you talked about the importance of data. You talked about having a digital twin of a vehicle and of a battery, and that data is needed to be used in the in-car software, but also in the business software. So how do the businesses actually get their data, ensure it's accurate and timely, and in order, it might sound simple, but organize data in the right way can be pretty challenging. So what strategies and technologies help companies collect, clean, manage and leverage data effectively?

Hagen: Absolutely. It's clearly [00:18:00] the point also where we need to bring in this big vision, and especially from a business process perspective, the supply chain market. And it's also not new to you and your listeners supply chain orchestration is a big factor, right? And it's a big vision. Which reacts on the one hand on a lot of this outside impacts where we started the whole conversation because if I want to react in time and want to be resilient, I need to have full

transparency across all the data, not only within my business, but also across the entire value chain.

Yeah. So the digital twin is one core component of getting the transparency, but also then having the connections from, as I said, the fully assembled vehicle all the way down to the raw material, to the lithium, for example, of a battery. I need to ensure this A, to be more resilient and to react in time, but also to optimize my business, right?

And to optimize my business is really. It's a number and it's a game of [00:19:00] sense. What we are playing in automotive, and especially for EV constructions, where I need to squeeze out every cent of the supply chain as it gets, right? Because if I want to increase my margins, which are either way, not that high in automotive, I need to be able to optimize my supply and my value chain at any time.

And having here full access to the data which are coming out of your direct value chain, sourcing what you drive as an end car manufacturer, but also all the underlying downstream processes from first tier, second tier, third tier, and end tier suppliers. But also, and it's the cool thing now, what we always had also on the upstream in automotive from the national sales companies, the dealers, the repair shops, and at the end of the life cycle, also the recyclers.

The ones who have the full visibility also on this data and access to the data they're winning to it, right? And having the right IT platforms, which then fulfill on supply chain [00:20:00] orchestration this is obviously a big vision and also a big mission to fulfill. And yes, from an IT perspective, providing the right platforms, the right business networks for sure is one of the key goals to go after. There was also a significant investment in joint project of the automotive industry kicked off the four years ago called Catena X, where you build this exactly joint open data sharing ecosystem where everyone has on a mutual trusted and data sovereign approach the possibility to exchange data.

And of course the access to data that's not even, really specific to automotive, it's super sensitive because on the one hand side you have suppliers who always think, oh, the big car manufacturers, they just want our data because they just wanna squeeze out another cent on it.

You have end customers, consumers said, why these Mercedes or BMW guys? They want the data, they just want to get our profiles, [00:21:00] whatever. So having this data sensitivity problem solved. Super, super crucial, right? And having initiatives like Catena X who raise the data transparency and the end-to-

end visibility for data across the entire value chain on a very trusted and sovereign basis, absolutely necessary to achieve and win in this whole game.

Oyku: I wanna go back to the lifecycle question that Richard asked earlier. So we see this EVs as the future of sustainable mobility, right? When you look at the sourcing and disposal of them, there might be still some gap that needs to be closed from a sustainability perspective. And as sustainability becomes a central concern, how are automakers designing, repurposing, and recycling strategies to build closed loop battery supply chains? Maybe we can also talk about the main challenges and opportunities in making this a reality.

Hagen: We were super lucky in automotive that I always could even say, Hey, sustainability is a [00:22:00] bigger opportunity then it's actually a burden, right? Of course if you look to regulatory requirementsand sustainability compliance processes. Of course, it's a mandatory to do thing and what all automotive companies need to apply on.

So talking about, for example, product carbon footprint and product carbon footprint, sustainability, carbon footprint exchange. This is necessary and everyone needs to do. I have regulatory things here in, especially on the European side called the battery passport, that you need to prove that your sourcing components are sourced on a most sustainable and in a most labor compliant way, right?

So putting this all into factor, it seems a little bit like a burden and an overhead. But on the other side, it brought also a lot of opportunities and especially if we are thinking about topics like Second Life and reusage of components at the end of the life cycle. And then we are again with our [00:23:00] material shortages, right?

It's not that long ago that the two, three years, all of our big automotive customers were in big trouble with raw materials. It's not only, semiconductors, it was lithium, it was nickel, it was carbon fiber, right? There's a lot of things which are actually shortages in the entire industry, and at the same time, you have this mass amount from vehicles coming back at the end of the life cycle and said, Hey, at the end a lot of raw materials are still in the cars. And guys, this is also no joke now I have it all across the world. At least three, four big car manufacturers who are just building so-called dismantling factories. At the end of the lifecycle where you have access exactly to the components and you just re bring the components and the shortage material back into the lifecycle. Either you use it by yourself, so you bring it into your own component, or assembly plants, or you resell it to the sub component suppliers to reuse it. So [00:24:00]

having , the big car manufacturers in that game of Second Life in recycling this is becoming almost now like a second business model in there, and it does make sense.

If you think about for the future, the battery will be for sure the most valuable component in a car. You should be able to have access and your hands on that at the end of the lifecycle. And this is what car manufacturers are doing.

Richard: So Hagen we're coming towards the end of the podcast. It's been intriguing and I I, want to ask some future-looking questions now. So, looking ahead, what breakthrough technologies or trends do you believe will significantly reshape battery lifecycle, whether we're talking about the raw materials sourcing to the second life usage to the end of life recycling that you started to touch on a little earlier.

Hagen: It's significant, right? Because I had once the chance to get to know the inventor of the lithium iron [00:25:00] battery. It's actually a Japanese company called Asahi Kasei right? Totally non-automotive related but these guys were inventing the lithium iron battery. And this was already in the nineties somewhere.

And if you see around how. The whole life cycle already evolved for how we could leverage news batteries and always think about, right? At the beginning it was massive pacs , what we talked about with heavy weights and mass complexity, dealing with problems of overheating and extracting the right energy at the right time, dealing with this max minimum amount of temperatures.

The whole industry has evolved dramatically. There's a complete from a whole product perspective, a new generation just now, which is now really at the forefront. And that's was always the goal, right? You know that the desire is to have with one load, 1000 kilometers, right? That needs to be the goal where actually a gasoline car is at these days a classical diesel. So 1000 kilometers with one load [00:26:00] and it's doable. You saw the first tests left and right from the hybrid car manufacturers. It's definitely doable. But if I think about battery lifecycle on the product by itself extract more performance, but also how with the connection of business processes, obviously there is this one number one topic which applies to so many areas, it's AI. And AI can, on the one hand side, if you do simulations on how the battery performance is handled in the best way, right? And that's the simple thing. If five passengers are in a car versus one, if it's hot, if it's cold outside, if you use AC if you use all your

electronic devices inside the car, there's a lot of what AI can predict and prevent.

And also how to optimize the energy and efficiency of a battery. That's number one. But number two AI to predict at the right time in a whole battery lifecycle management, when to do the right maintenance, when to actually substitute a battery, how to actually [00:27:00] dispatch and reuse components in other ways. I think platforms and tools loaded with AI can solve and contribute a lot more in this game, and we will see this in the future as well business and product-related.

Richard: Yeah, it goes back to the data as well of having the accurate data to make those right decisions or AI to make those right decisions. So the final question we ask all of our guests is a broader question around supply chain. So in a sentence or two, from the automotive industry perspective, what's the future of supply chain?

Hagen: It's a good one, right? No. For sure it's one of the most exciting times as I said, at the beginning for automotive. One thing is clear with a massive disruption what we see, supply chain, and it's always what we see if we're talking about the four, five big strategic priorities, supply chain will be one of the crucial factors for automotive also in the future, right?

It's a [00:28:00] global business and it's a global supply chain indeed, what we are doing. And these relationships on the one hand side get more complex, but also bring a lot of opportunity, not too well in there. The way how we also optimized complete areas of the business for the automotive industry will increase. Looking for example, at the entire area of spare parts management, that's not even what we have touched now in the short time. If you think about the millions of auto parts which are gonna ship left and right, this is the heart of any supply chain. Spare parts planning is one of the most complex things in the whole world.

And this will also, of course increase with the number of EVs on the street, complexity and so on and so forth. And last but not least, I would clearly say also this entire from customers to promise of the supply chain will always be a crucial factor of foster the customer experience. Yes, I think the future for supply chain, automotive will be bright. There is more than enough [00:29:00] opportunities to optimize, to deal, to squeeze the right efficiencies and productivity out of certain areas of production logistics, planning, quality management operations assessment is more than enough disciplines where we can always help and contribute on supply chain for sure.

Richard: Hagen, thanks for a great conversation. It's been really interesting.

Hagen: Was super fun guys and talk to you soon, looking forward.

Richard: And thanks everyone for listening. Please, mark us as a favorite, you can get regular updates and information about future episodes, but until next time from Hagen or Oyku and I, thanks for discussing the future of supply chain.