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[SPEAKER_00]

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[SPEAKER_05]

Today, our guest is Julian Schwabe, who is assistant professor of geography at Philips University Marburg.

And he has been working with the topics related to geography, environmental sustainability, and recently the EV technologies.

[SPEAKER_04]

Welcome to Stavanger.

Julian, do you want to say something?

Hello.

Glad to be here.

That was a great start.

I would like to start with a really personal story that you can reflect on in your own past.

What's your story?

What brings you to economic geography?

What brings you to the research you're doing?

And yeah, what motivates you to keep doing this research?

[SPEAKER_03]

Okay, so I'll try to keep this succinct.

I have been in my studies focusing on China and living in China for quite a while and also working outside of academics in China.

So my start of my work life was...

Back in 2010 in Beijing, where I worked for a startup consultancy after studying in Marburg, working in Beijing for a startup consultancy that did market research on electric vehicles, renewable energy at a time where electric vehicles were a topic.

where nobody really took it serious yet.

But so this is how it started.

And for several years I started, I worked for business consultancies before I entered academia.

At that time, beginning of the 2010s, air pollution was increasing. a big topic in China.

And I did my external PhD thesis on environmental policy change triggered by extreme events of air pollution in Beijing.

So that was

a big topic at the time.

The situation has improved quite significantly since.

But so doing this PhD externally was my entry ticket.

Then again, to get back to academia, I somewhat gravitated towards that.

And after some work at business consulting, then afterwards in Germany, I entered the Department of Geography in Marburg as a then researcher.

[SPEAKER_05]

Yeah, perfect.

Since you have worked in both contexts, in China as well as Germany, so I would say in Asia as well as Europe, how does that shape your understanding of

innovation and regional development?

[SPEAKER_03]

yeah well well i would i would like to think that um i have some expertise about Asia and China sort of the the cultural nuances um even though i would say that um it's not say that it's impossible but it's very very difficult to get a profound understanding on how

China is working, given the vastness of the country and also the diversity of the society.

But I would say the way how it shaped my understanding, it may sensitized me a bit more to

to the cultural nuances of regional development processes in, let's say, Europe versus China, the mechanisms behind them, the role of networks or sort of the role of informality, the role of formality in all of these processes.

And, of course, you can study all that, but then being there and talking to people

there on the ground, of course, shapes your understanding in yet a significantly different way.

And that was also relevant for my PhD thesis at the time when I was examining the, let's say, the mechanisms of policymaking in China in response to extreme environmental events in that case.

[SPEAKER_04]

I'm very intrigued by the word you used, the cultural differences in the way they do regional development.

I want to come back to that in a bit.

But to contextualize that, I want to ask you, first of all, based on your research, what does the global production network look like right now for electronic vehicles and the batteries?

And based on that, later I will ask you, what's the cultural difference that's driving this?

What does the production network look like globally?

[SPEAKER_03]

Okay, yeah, so...

Globally, we have to view this in the context of automotive productions in general, right?

And the transitions that are ongoing.

And electric vehicle can be considered to be one of several very profound technology changes that are shaping the automotive industry along with, for example, the emergence of autonomous driving and robot taxis.

I mean, the implications of

this still somewhat remains to be seen in terms of vehicle usage and markets. But then these technological paradigm shifts are actually ongoing, relatively independent from each other.

There are some points of intersection, of course, but you could in principle have a gasoline car that drives fully automatic,

Or then, of course, vice versa, the electric vehicle that's not autonomous.

So the change towards electric vehicles, change towards battery, that represents a replacement of the propulsion technology, right?

And it disrupts the industry fundamentally insofar as large, very comprehensive technologies

industry structures that have been established over a century and being orchestrated by the big incumbent vehicle manufacturers, Volkswagen, Ford,

Toyota, and so on, that they are at risk of becoming redundant.
Very comprehensive structures raising all kinds of questions related to employment, regional development of the affected regions.

Germany is undergoing this difficult transition currently and at the same time we have emerging Chinese firms that have developed an industrial leadership in this core technology of the battery cell. This whole technology shift would not be as disruptive if the battery cell would not represent a core technology that defines the performance and the product of the vehicle. It affects the vehicle design fundamentally.

And this capability of battery cell manufacturing is incredibly complex. It takes...

If you looked at it, it took the Chinese battery industry 10 to 15 years to develop, to master the production processes of the battery cell.

So this is a capability that is outside of the traditionally accumulated capability of vehicle manufacturers.

But they have to access it somehow.

They have to either internalize it or access this capability in another way. And Chinese, mostly Chinese, not only, but mostly Chinese, also South Korean firms, have industrial leadership, have developed industrial leadership in this core technology.

And then we have...

Of course, evolving Chinese automotive manufacturers also.

A firm like BYD that sort of grew up as a battery company but evolved towards being a vehicle manufacturer.

So we have this profound shift in industrial hierarchies and the pressure on incumbent firms like...

Volkswagen is feeling that very intensely right now to retain competitiveness, to develop the capability of producing a competitive electric vehicle.

And you have to have the battery cell production capability and battery design capability to do that, because the battery cell needs to be customized to... the vehicle platform, the vehicle design and just out of corporate strategy, OEMs cannot make themselves entirely dependent on battery manufacturers.

So this means we can see this tension here right now of industrial hierarchies between incumbent OEMs trying to defend their turf so to say and emerging battery manufacturers from East Asia that are currently the only ones who have mastered this technology and

we can see as a reaction.

So in terms of GPNs, we can see quite simply that battery cell manufacturing is in all stages of the value chain being dominated.

You could even say dominated maybe by Chinese firms.

From cuts from materials processing to producing the active material and the manufacturing of the battery cell itself.

And so this capability is situated in China.

It is a little bit a reversal of capability, of the local concentrations where the core capabilities lie, right?

The core capabilities of producing an electric vehicle lie in other places compared to the core capability of developing and producing the combustion engine.

Combustion engine, we have Germany and the corporate headquarters, Wolfsburg, Stuttgart, Neulich.

These are the kings of the combustion engine, right?

And

And at some point, the Chinese policymakers figured that they would not get close or even overtake this capability of making combustion engines.

But now in the core capability of

battery production, battery cell design and manufacturing is located, for example, very much in the Pearl River Delta in Shenzhen, especially Shenzhen, but also Guangzhou, where not only, I mean, the biggest battery manufacturer is headquartered in Ningde, that's CATL.

They originate from Shenzhen, but this is where the whole ecosystem is localized that orchestrates this co-innovation of production capability.

between battery cell manufacturers and then technology specialists that supply production equipment.

And these two types of companies.

They interact very frequently.

They communicate frequently about their transactions to make the transaction successful.

The transactions are very complex in delivering machinery, but also in terms of what is needed to improve the process and what is technologically possible.

dense process of co-innovation that requires spatial proximity.

You do that effectively if you have the same language, same culture, a common code of conduct, it facilitates this co-innovation.

And this then puts incumbent firms at a structural disadvantage.

So we have battery production networks being battery cell manufacturing and its capacity and technological capability being dominated by Chinese and to some extent also South Korean companies.

Also in Europe, those companies provide the main capacities, main deliveries of battery cells for the European market from gigafactories in Hungary and Poland, mainly.

But then we have OEMs in Europe, incumbent OEMs that...

try to establish a certain independent capacity of battery cell production and battery design.

So they invest in their own subsidiary companies.

VW has a company called Powercore.

And then Stellantis and Mercedes-Benz, they invest in ACC, a French battery startup.

Renault has invested in Vercor, another French battery startup.

So these are attempts by Incumbent OEMs to access those capabilities that are very, very difficult to replicate.

Yeah.

that they don't have internally, but that are essential for making competitive cars.

So they invest billions in those battery startups to develop a certain independent production capacity

technological capacity in battery cell production technological know-how in battery design so that they as vehicle manufacturers keep authority over the vehicle design and they invest

several billions of euros in those facilities and it takes years and if you have maybe also seen some media reports of it there have been many reports about how projects get delayed and cancelled and of course Northvolt was a very prominent case it was not a full subsidiary of OEMs but

also one of those projects trying to establish independent capacities.

But the thing is that even those startups, when we talk about regions or the geographies of it, those battery startups and their facilities, they tend to be located near or power core for example near Wolfsburg near the corporate headquarter their location is not not primarily owned not only based on cost

considerations but also has political influences that these facilities are located in let's say core regions automotive core traditional core regions But so the idea of establishing independent capabilities is questioned by the way how they establish, how they access the existing knowledge about process technology because also those companies rely heavily on process technology coming from China.

So it is firms from the Pearl River Delta mainly, but also Greater Shanghai is also a sort of a cluster where those technology specialists for production processes are being located

They emerged from related industries.

It's from producing lithium batteries for laptops or from producing lithium batteries for small bikes and so on.

So from there, they could move on towards the...

let's say, the primary league of battery production, which is for electric vehicles.

So the European startups have to rely on production technology coming from China.

Machinery firms from East Asia make

Over 90%, or as of 23, based on the report by the German Machinery Association, they asserted that over 90% of production machinery is coming from East Asia.

So it is a firm like PowerCore.

or European battery startups that heavily rely, at least in their initial ramp up of production, on Chinese production technology and then also on the know-how of these firms to train up the staff of the European startups.

um to to get the know-how and get the process accumulate the process experience to properly run a production line and this this takes years it gets delayed it gets more expensive than expected it takes years because it's relying on tacit knowledge personal experience yeah

And it's difficult to replicate.

Despite the German machinery sector being traditionally strong,

There are not many firms from Germany.

There are a few, a couple, but not many that would want to enter this market of battery cell production technology because it is already mainly occupied by Chinese firms that have years of experience and also competitive, very significant cost competitive advantage compared to machinery that will be coming from Europe.

Yes, so now I talked a lot, but these are sort of the contours of the emerging production networks for electric vehicle and for battery production that are I always like to draw this contrast to the combustion engine technological domain, where with this technological paradigm shift also the industrial hierarchies and also the geographical distribution of power, if you will, has shifted quite significantly.

[SPEAKER_05]

Yeah.

If we talk about your current research to the audience who are not from the field, how will you make them understand what you are currently researching?

[SPEAKER_03]

I would say it's not too difficult to understand because it's a topic that is of interest to the general public.

It is quite present to the media and

What I try to look at is, of course, a bit deeper into not only production capacities and which production capacities get situated where, but then also at

the why and the nuances that I've just talked about. But the overall concept, I would say the dynamics, if we talk about this whole conceptual framing of global production networks, the basics of it, I would say, are reasonably well accessible when we talk about the geographic distribution of value creation and the explanatory factors behind it like um dynamics like technology technological paradigm shift that we have talked about now but then also geopolitics geopolitical considerations um all of these influences that shape the way which which companies are important in this business and where they locate their value creation it is i would say from a geographical it's quite simply doing economic geography. That has been also my approach for this particular study, which is focusing on Europe.

First looking at which places are which which value creation steps of the battery value chain. And then you can go on and mobilize concepts to explain why this is the case and what are the dynamics behind it.

But I do think that Generally, the topic of electric vehicle production, batteries, also this whole nexus to the energy transition and the need for renewable energy that is with this whole system transition that is needed if we were to truly decarbonize our way of living.

Because it is quite present in the media and it is of interest to the general public, I would think that most people have some sort of understanding of the topic.

And what we can add is researchers, of course, dig deeper, add the nuances, talk about the stakeholders that are important, but that are not so much in the focus of attention.

For example, these technology specialists making process technology, the importance of know-how that is bound in persons because quite simply there are currently in europe not enough persons who have a decade of experience in battery cell manufacturing this is currently being established and it takes time it takes maybe a decade to accumulate that and there really is there are very few shortcuts to that.

Unless, I mean, there are some shortcuts.

You can buy the machinery of established players and you can try to hire their personnel or you can pick personnel from CATL, for example, to help build up your own startup company.

This happens, of course.

But in the end, the one thing that is probably less visible is this accumulation of know-how, building teams, establishing routines, protocols, codes of conduct on the factory level.

That is needed and that takes years.

I mean, I'm convinced firms like PowerCore or VerCore

They will succeed in producing battery cells, but it takes time and money.

[SPEAKER_04]

I want to reflect on a couple of points that you've made, and these are all so many new things for me as well.

Well, first of all, Chinese firms are instrumentally far ahead.

in this technology, but then also there are incumbent firms who are trying to have their independent capacity within Europe.

Reflecting on these two statements, what does this say about globalization in

general?

Why is there a need to develop that capacity here when Chinese firms are already doing it so well?

Are we receiving globalization?

Are we trying to de-globalize?

What do you think about globalization in this front?

[SPEAKER_03]

Yeah, that's a good question.

It's a little bit difficult to sort of quantify the influence of globalization or de-globalization or let's say geoeconomic considerations, geopolitical considerations.

on the way how they make decisions of how the how incumbent firms or battery manufacturers make their investment decisions but of course it plays a very significant role so i've been asking these questions to come to interview partners as well and they they do say

For example, if there is an export ban on critical material inputs like we had in the context of rare earths from China or in the context of, let's say, low-tech microchips for the automotive industry, it does change the discussion in boardrooms.

So I've been told, I mean, just because it raises awareness of the uncertainty of the risk that states may weaponize these dependencies on critical material inputs.

And so in general, also for the battery industry, you can see that there have been initiatives by the EU, like the Critical Raw Materials Act or battery projects being funded under the IPCEI initiative for batteries.

strategic European projects so that the EU does have mechanisms that try to localize onshore some of those critical production inputs.

And that includes cell manufacturing, but it also includes the processing of precursor materials, the processing of chemicals that

cathode material and anode material that then goes into the cell factory

graphite for example is one material that is its anode material that is what china has almost a monopoly on um so these these are the kind of dependencies

that on the state level states are trying to reduce um on the company level this this uh

this push towards reducing critical vulnerabilities expressed slightly differently.

For example, if you look at VW, at Volkswagen, they establish sort of independent value chains within China and outside China.

[SPEAKER_01]

Okay.

[SPEAKER_03]

or independent research and design capacities than also inside China.

So a VW maybe in the future completely designed, manufactured in China for a long time, but also then designed in China.

Perhaps in the future, even for the world, we'll see.

But then, so these are moves to...

move also some critical capacities closer to the markets they operate in.

And in terms of battery cell manufacturing, there certainly is a geopolitical push on part of Europe to localize at least a certain amount of critical capacities on the continent.

But part of this is also when we talk about the startups, the European battery

startups that are invested by instrument OEMs.
I would say this is not only because of geopolitics.
A very large part in this is also corporate strategy that goes back to the characteristics of the automotive industry.
where automotive manufacturers generally want to have the design authority over all systems that are important.
And that includes the battery cell.
They cannot make themselves dependent on firms like Kettle too much.
So to say you cannot always buy sort of a battery cell off the shelf, if you will, because it needs to be customized to a certain extent you can do that but it needs to be for a good vehicle the design needs to be customized to the vehicle's platform yeah um so this is i would view this push as more of a result of corporate strategy and as a result of the general characteristics of the automotive industries where OEMs manage their brands, they are liable and they therefore want to control the key aspects of design.
And
Then OEMs have different strategies, whether they want to actually produce batteries themselves.
Some don't do that.
BMW, for example, does the design only and outsources the production to...
Eve Energy in this case, who are sort of strategic partners in a more exclusive delivery relationship.
So we have this variety of relationships between OEMs and battery cell manufacturers that express different degrees of attempting independence or just some
For example, CATL in Hungary, they just serve the bulk of the market.
Yeah.
But I see both
And in the emerging contours of this production network in Europe, I see both mechanisms, geopolitical considerations and corporate strategy at work.
And then, yes, I've been thinking about that, but maybe not sure if it's possible to...
really disentangle which of those dynamics exerts exactly which kind of influence.
But despite geopolitical tensions, interdependencies in terms of the technical, in terms of know-how transfer, trade, know-how transfer, investments.
remain very intense, so to say.
Like what I've just described a minute ago about technology specialists on production processes.
This cannot be replaced in the short term.
Also, capacities for cell manufacturing, capacities for delivering cathode and anode material, all of this takes...
years to establish and probably doesn't make much economic sense if you view this purely from an economic point of view it is cheaper to just import everything from china so corporate strategy and geopolitics certainly play are very significant in explaining these emerging contours of the industry in europe especially

[SPEAKER_04]

on that point exactly I'm loving the depth in this discussion so I'm so intrigued listening so well can we just on the last sentence you said can we now discuss a little bit on the intra-regional structures of

Within Europe, which regions are performing?
How are they performing?
Which regions are winning?
Which regions are losing out?
You mentioned the example of Nordvolt and so many other incumbents in Germany.
Can you give it an intra-regional perspective in Europe as an economic geographer?

[SPEAKER_03]

So what I have seen, what we tried to do really was to...
map the entire value chain, like making a map of every individual facility.
Every facility is a small dot on this map and so on.
from what you could see in localizing structures for battery and electric vehicle manufacturing is to a certain degree a reproduction of this core periphery dichotomy.
At least if you see that the highest variety of functions, the research capacities, like the new research capacities for battery design, pilot lines...
They are located in Germany, for example, close by the traditional headquarters.
So the German OEMs locate also those critical functions in the realm of electric vehicles close by their traditional headquarters.
And this is...
One reason is certainly that they do have this pool of necessary know-how, necessary personnel also there.
But symbolism in this regard...
certainly also plays a role.
For example, if PowerCore, the VW subsidiary battery company, places its first Gigafactory, a strategically very important investment, it carries symbolic value also, and it is sort of expected also that they will place this nearby their corporate headquarters.
So in terms of the...
localizing a high diversity of functions.
One could see that also in electric vehicle production, Germany remains a core country, at least within Europe, as opposed to, let's say, lower cost Eastern European countries.
integrated periphery as as peter pavlinek has called it that concentrate manufacturing intensive lower cost functions that are dependent on foreign capital and this can also be seen in the realm of ev this spatial hierarchy of different functions there is there is some in
Here and there, you find also startups.
For example, InnoBud would be a startup from Slovakia, if I'm correct, that are also partnering with a chinese firm gaussian high tech to establish an innovation research and innovation center in slovakia so we we have that as well but the bulk of the capacities is in eastern europe is in terms of vehicle production and battery manufacturing is foreign owned and manufacturing intensive so to say and basically um relying on eastern european locations being relatively low cost but if we if we if we talk about the transitions from combustion engine towards electric vehicle engine then we have in germany a hundreds of companies, hundreds of generic parts suppliers that are really at risk of going out of business.
And the biggest clusters of those suppliers are in the rural area, the heavy industry area that is localizing traditionally coal industry not anymore but coal steel um and automotive parts then logically being placed in close proximity and a lot of those generic suppliers are also

located in stuttgart or in the in the traditional automotive clusters in germany and those companies are um facing existential risks if they cannot enter other markets or if they cannot enter the electric vehicle market with their parts. But this is difficult because no other market other than automobile offers such high volumes. Some consider chip making, for example, or aviation, but you have low volumes there. Some companies may find a market there. And then electric vehicles require fewer parts and different types of parts. Not so much steel, a bit more other lightweight materials. So I would say, despite Germany within Europe fulfilling this function as a core country, if you will, in the electric vehicle production, it is still... several regions, maybe the country as a whole is undergoing a very difficult transition because of this technological change and because it makes those structures that have been built over decades they're facing redundancy, right? If we talk about a scenario of full electric vehicle market coverage, then they're facing redundancy and either go out of business or upgrade into other less stable, less attractive, less volume markets. But you see that quite clearly in many German regions as they also in media reports. This company goes out of business. That company goes out of business. Bosch is letting thousands of people go. This is a process of a certain process of deindustrialization that is currently ongoing.

[SPEAKER_04]

The incumbent firms, yes.
I think we have a really long conversation.
Yeah.
That was really good.
But maybe we want to wrap up?

[SPEAKER_05]

Yeah, we'll talk about the keyword.
Yeah?
Yeah.
We can right away start talking about what do you think about peripherality.

[SPEAKER_03]

Okay.
Peripherality in the context of electric vehicles or the automotive industries can be viewed in many ways.
Places can be core and peripheral.
Technologies and systems inside the vehicle can be core and peripheral.
So I was talking a lot of core periphery in this whole context.
I think it helps framing the matter.
But let's say about places we...
see a reproduction of core-periphery spatial hierarchies purely in the realm of electric vehicle and battery production in Europe.
But then we may have some sort of macro relationship of core-periphery, intercontinental core-periphery relationship between China and Europe because

China is most definitely the core.
as an industrial leader and as a technology leader.
And expressing the Chinese-European relationship purely in core periphery
probably doesn't do justice to the complexity of the whole thing.
So core periphery, while I like this as a concept, it does have its limits.

[SPEAKER_05]

Okay.

And the next keyword, I mean, the keyword for our next speaker would be?

[SPEAKER_03]

Geopolitics.

[SPEAKER_05]

Oh, okay.

Geopolitics.

That's a very heavy one.

Yeah.

Thank you, Julian, for joining us today.

And thank you very much to our audience listening to the RegInno podcast.

Till we see you in the next episode and we keep uncovering stories and ideas
behind academic research that shape our understanding of innovation and regional
development.

Thank you very much.

Thank you very much.

[SPEAKER_00]

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