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Opinion

How China shifted gears on electric vehicles – and why it matters

Marina Zhang
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Volkswagen, the world's leading automaker, recently announced a $700 million investment plan in Xpeng – a rising Chinese electric vehicle (EV), including hybrid and battery EVs, manufacturer. This partnership aims to create two EV models specifically for Volkswagen, with designs tailored for China's mid-range market. This strategic move is a response to the swift shift towards EVs in China, the world's largest automobile market. By the end of 2022, there were over 415 million motor vehicles on China's roads, including 26.8 million new vehicles registered in 2022 alone. Volkswagen, as the first foreign automaker to venture into the Chinese market in the 1980s, derives half of its global profits from China, although the sales there represent less than 40 percent of its global total.

This recent development highlights China's rise in the EV sector and its growing dominance over associated supply chains, signifying a significant shift in the global automobile industry. In fact, several German automakers, including Mercedes and BMW, are also contemplating relocating their European EV production lines to China, lured by the country's advantages in EV technologies and cost-efficient supply chains.

Despite this, China's ascendency remains somewhat underappreciated. Policymakers must thus ponder a pair of relevant questions: how will the world adjust to China's dominance in the EV landscape, and what are the geopolitical implications of such?

The changing of global automotive industry supply chains

China is by far the world's largest EV market, with more than half of EVs on roads worldwide being in China. The country's rise in EV manufacturing has left many global automakers struggling to enter the Chinese market. For example, Volkswagen's market share in China has plunged from 16 percent of its peak between 2008 and 2020 to approximately 10 percent in 2022.

China-made EVs, meanwhile, are rapidly gaining market share. In 2022, China sold nearly 7 million EVs, representing almost 26 percent of the new car sales, marking a 54 percent increase from the previous year. Projections for 2023 anticipate that China's EV production will hit approximately 8.8 million units, likely to represent 37 percent of the new car sales. China also exported more than 3 million automobiles, most of which are EVs, making the country the second-largest automobile exporter after Japan.

Throughout the automobile industry's history, European, especially German, automakers have dominated with top-tier engineering and quality vehicles. China, despite having made significant strides in manufacturing since the 1980s, has struggled to compete in the traditional automotive sector. Until September 2022, over half of the vehicles on China's roads carried foreign brands.

However, the transition to EVs has provided China with an opportunity for leapfrogging in both market share and technology. China's EV brands, lauded for their cost-effective and innovative solutions in infotainment and intelligent driving, are gaining traction domestically and globally. Even with the discontinuation of subsidies at the end of 2022, EV sales in China have exceeded expectations, achieving penetration goals two years ahead of schedule.

European car manufacturers, in contrast, are primarily experienced in combustion car manufacturing and rely on supply chains centered on combustion engines and gearboxes. This incumbent position, once a strength, is now increasingly a liability. This is because automobile manufacturing encompasses a lengthy value chain, from upstream elements (like steelmaking and rubber production) to downstream activities (like distribution, maintenance, and services), with car manufacturers in the middle. Each car consists of tens of thousands of parts, most expected to last over a decade and withstand various weather conditions while being also relatively cost-effective to repair and replace. Crucially, these parts and components aren't solely produced by one manufacturer but rather involve participation from hundreds or even thousands of part and component suppliers across multiple countries and continents. As such, now stuck with these legacy supply chains, European carmakers confront higher hurdles during their transition to EVs when compared to Chinese EV manufacturers.

A country's car manufacturing capability is a testament to its advanced manufacturing prowess. Industrial powerhouses, notably Germany and Japan, where value-added in manufacturing – largely driven by the automotive industry – account for over 20 percent of their GDP, are global leaders in the automotive industry. In fact, the automobile industry serves as one of the largest economic pillars in both these countries, contributing significantly to not only economic output but also employment. In Germany, industries related to automobiles provide over 460,000 jobs, accounting for 17 percent of the country's workforce.

To compete with local Chinese EV manufacturers, both Germany and Japan must reconstruct and reorganize their established supply chains, which are rooted in their traditional automaking strengths. This transition implies they need to relinquish some of their core advantages in conventional car manufacturing, a challenging task. Destructive innovation is easier said than done, especially when such destruction involves the economy, employment, and related social welfare.

There are other issues at stake. On the demand side, Europe has emerged as the world's second-largest EV market after China. Influenced by environmental policies, such as the planned 2035 ban on the sale of combustion vehicles, and consumers' push for decarbonization, Europe is progressively adopting new energy vehicles, primarily EVs. However, manufacturing costs in Europe have constrained the widespread adoption of EVs. As stated by the CEO of Stellantis, Carlos Tavares, the cost of producing EVs in Europe is about 40 percent higher than producing similar vehicles in China. As a consequence, Chinese-made EVs could pose a significant threat to European automakers, potentially resulting in a loss of 7 billion euros ($7.7 billion) in annual profits by 2030.

Overall then, China's ascendance in the EV sector could potentially disrupt the industrial structure in countries where automobile production significantly contributes to their manufacturing sector. This disruption extends beyond car manufacturers and affects the complex supply chain network of components and parts manufacturers.

Vehicle purchasing is almost a zero-sum game: if a consumer buys an imported, cheap EV from China, the buyer will not buy a locally-made one in the short term. Middle-class consumers in Europe are seeking more cost-effective EVs that offer advanced digital and intelligent features – areas where Chinese EV makers excel.

To compete with Chinese EV makers, automakers must look for more cost-effective solutions for their EVs. Will Volkswagen's investment in Xpeng set an example for others to follow?

China's cost advantages in EV manufacturing

As a latecomer in combustion vehicle manufacturing, China developed little indigenous technological innovation after two decades of catching up in the automobile industry through its 'technology for market' scheme.

In a strategic attempt to overcome its latecomer disadvantages, China has focused on developing new energy vehicles (NEV) since 2006, issuing over a hundred related policies. Pre-2014 policies set broad industry goals, encouraged technological exploration, and used public procurements to support domestic NEVs. In 2015, electric vehicles (both battery and hybrid) emerged as the standard in the NEV sector over alternatives like hydrogen vehicles. From 2015 to 2020, subsidies were provided for both supply and demand sides of EV manufacturing, incorporating direct financial aid, R&D investment, energy credits, and consumer incentives such as tax rebates and preferential license plates. Post-2020, the policy emphasis shifted toward industry regulations.

China's rise in EV manufacturing is reflected in its market adoption of EVs. Before 2020, the growth of the EV market was largely driven by subsidies. However, from 2020 to 2022, government subsidies began to decrease, with annual reductions of 10 percent, 20 percent, and 30 percent respectively for each year, and they were completely phased out by the end of 2022. During this process, less competitive automakers and suppliers that were reliant on these subsidies were forced out of the market.

Apart from long-term policy and subsidy support, China also employed an exaptation strategy in constructing its EV supply chains. For the unaware, exaptation refers to the re-purposing of technologies for unexpected functions. In the context of the EV supply chain, power batteries, electric components (such as electric motors and electronic control systems), as well as intelligent driving and infotainment systems have greatly benefited from China's dominance in electronic and electric supply chains. For instance, the Yangtze River Delta, which encompasses Shanghai, Jiangsu, Zhejiang, and Anhui, has emerged as one of the EV supply chain clusters, due to its already established role as a hub for both traditional automotive and electronics supply chains. Within a four-hour driving distance in this cluster, there are over 3,000 enterprises forming a complete EV supply chain, covering power batteries, transmission systems, braking systems, steering systems, lights, accessories, and car body and seating.

American EV giant Tesla played a pivotal role in the construction of China's EV supply chain. As a prerequisite for Tesla to establish a wholly-owned 'gigafactory' in Shanghai (the first of its kind in China's auto industry), Tesla agreed to incorporate locally manufactured parts and components in its EV production. Of the 19,000+ components in a Tesla vehicle, the proportion of locally produced ones surged from 50 percent at the end of 2019 (when construction of its Shanghai plant was completed) to 70 percent a year later. By the end of 2022, more than 95 percent of the parts used in Tesla products were sourced locally.

As a tech-centric company, Tesla employs a highly integrated design model, building upon highly integrated modules, to achieve cost efficiency in large-scale production. Chinese domestic manufacturers must meet Tesla's stringent standards to qualify as suppliers, which sparked fierce competition among local suppliers. However, this dynamic has contributed to the development of a local EV supply chain due to spillover effects: Tesla's lead suppliers that integrate different parts and components into integrated modules for Tesla's EVs have formed robust sub-supply networks.

These sub-supply networks also supply their parts and components to domestic EV makers. Unlike Tesla's model of integrated modules, which can limit the speed of developing new vehicle models, domestic EV makers purchase parts and components and assemble them either in-house or at contracted factories. While this model may be less cost-efficient, it provides local EV makers with the agility and speed necessary to produce new and customized models for different segments of the market.

The geopolitical implications of Chinese dominance over electric vehicles

China's ascent in the EV market marks the first instance in history where a country with a political regime and ideological values that differ from the democratic West is gaining momentum in a key industry representing the pinnacle of large-scale production. The implications of this rise are profound and far-reaching.

As a de-risking strategy, European automakers are being attracted to build their production lines in the United States via industrial policies such as the Inflation Reduction Act passed last year. In fact, some have already relocated part of their production facilities there – Mercedes has established a new battery factory in Alabama, while BMW has invested in EVs in South Carolina.

Shifting gears on the EV track won't be smooth for Chinese EV makers. The high degree of globalization in the complex EV supply chains presents significant challenges. Potential chokepoints, such as the control over supplies of high-end chips used in EVs, are particular areas of concern. These chips are integral to many EV components, from electric instruments to chip-embedded tires.

Data security is another critical concern. As sensor-equipped Chinese EVs could accumulate potentially sensitive data, other governments must balance cost-efficiency with security when importing Chinese-made EVs. China's approach may offer a reference point, as it has implemented stringent data localization rules for Tesla EVs and restricted the use of Tesla vehicles in sensitive areas.

Chinese EV manufacturers face significant hurdles in establishing their brand image overseas. To do so, they need to develop local service systems and foster strong relationships with local dealers. Both tasks require a high degree of knowledge and a deep understanding of local cultures and institutions.

In relation to the Chinese market, it's essential for Western car manufacturers to engage in collaborative R&D and product design efforts with their Chinese counterparts while maintaining a pragmatic approach. Volkswagen's investment plan may provide a good example.

Conversely, it's crucial for China to keep its market open to foreign car manufacturers, even within the EV sector where China has developed certain advantages. Tesla's success in China serves as a prime example of such collaboration. From a geopolitical perspective, global collaboration is vital in establishing international standards for the EV market, especially in areas like data collection and storage, for the industry to advance. Ultimately, the interplay of competition and cooperation benefits consumers and facilitates the transition towards clean energy transportation.

Dr Marina Zhang is Associate Professor – Research at the Australia-China Relations Institute, University of Technology Sydney.