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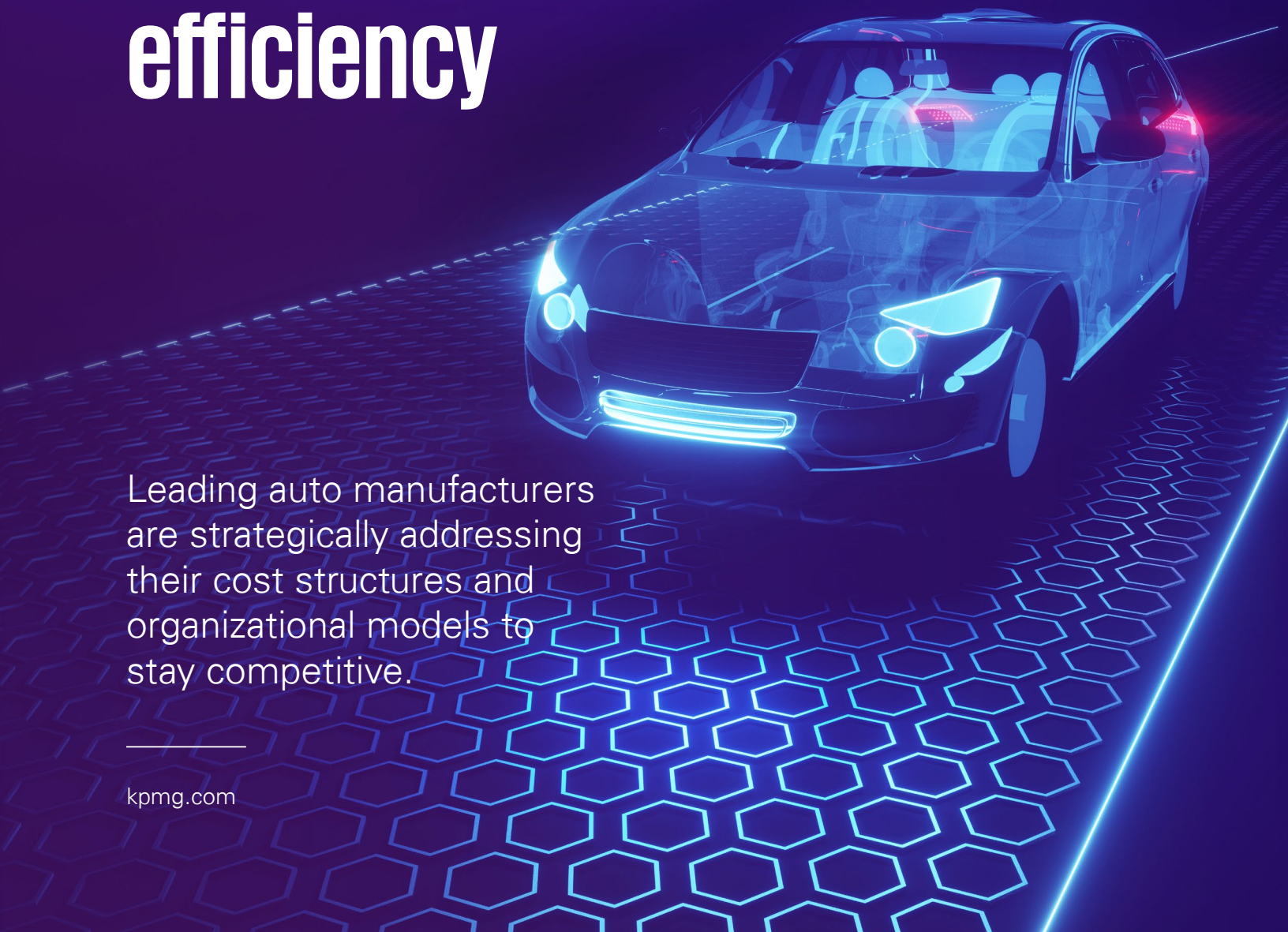
A race to the top: How automakers can turbocharge efficiency



Leading auto manufacturers are strategically addressing their cost structures and organizational models to stay competitive.

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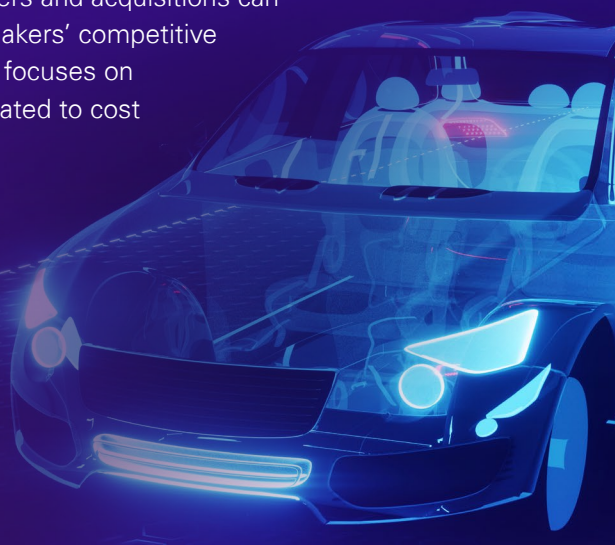
Introduction

Looking beyond the current storm of uncertainty, the automotive industry is undergoing significant transformation. Rapid developments in powertrains (electric vehicles and hybrids) and the rise of formidable new competitors are challenging traditional business models. For many incumbent original equipment manufacturers (OEMs), new battery electric vehicle (BEV) manufacturers are no longer just upstart challengers but chief competitive threats.

In 2024, legacy automakers faced a series of setbacks that highlighted their recent struggles. General Motors abandoned its much-touted robotaxi initiative, Cruise, citing intensifying competition despite having spent more than $10 billion on it.[1] In Europe, Ford and Volkswagen have announced layoffs and factory closures.[2] The CEO of Stellantis, the Italian-American conglomerate that owns brands including Fiat, Peugeot, and Chrysler, resigned amid declining sales and profits.[3] Japan's Nissan also announced layoffs and explored a possible merger with Honda, which ultimately fell through. With the slower than-anticipated pace of BEV adoption, many OEMs are also rethinking how to deploy assets and capital. For example, Ford has entered into an agreement to allow Nissan to use part of its flagship US battery plant in Kentucky.[4]

In stark contrast, BYD, China's leading automaker, is now a top BEV manufacturer and is planning to expand into Europe with new plants in Hungary and Turkey.[5]

To maintain competitiveness amid this upheaval, global automakers can focus on addressing cost pressures and inefficiencies embedded throughout their operations. This report delves into the challenges within automakers' cost structures, drawing on our extensive experience working with auto OEMs and insights gleaned from in-depth interviews with industry veterans. It examines issues related to design processes, organizational dynamics, and supplier relationships and provides strategic recommendations to enhance efficiency in these areas. While government policies such as tariffs and market moves including mergers and acquisitions can also complicate automakers' competitive positioning, this paper focuses on foundational issues related to cost inefficiencies.



[1] Lora Kolodny and Michael Wayland, "GM exits robotaxi market, will bring Cruise operations in house," CNBC.com, December 10, 2014.
[2] Jack Ewing, "Automakers thrived in the pandemic. Many are now struggling," The New York Times, December 15, 2024.
[3] Michael Wayland, "Stellantis CEO Carlos Tavares resigns amid problems in U.S., falling sales," CNBC.com, December 1, 2024.
[4] Christopher Otts, "Ford poured billions into two EV battery plants. It's only using part of one," The Wall Street Journal, May 20, 2025.
[5] Tim Urquhart, "BYD in Europe seeks major expansion in coming years," S&P Global, February 21, 2025.

What are the sources of cost inefficiencies?

Understanding the sources of cost inefficiencies is crucial for maintaining competitiveness in the automotive industry. Factors that inflate costs and stifle innovation include suboptimal design processes and redundant global operations that may need to be shut down. Eliminating production capacity is not easy, of course, especially in some high-cost countries (e.g., Germany, Japan, and the United Kingdom) because it could entail billions in restructuring costs. Nevertheless, a deeper understanding of the origins of common inefficiencies entrenched in many automakers' existing operations may help them develop better strategies for lowering costs.

Suboptimal design processes

Many established auto OEMs grapple with slow decision making, particularly during the design stage. An overly complex design process stemming from multiple rounds of technical reviews and supplier evaluation can hold up new product introductions and model updates. These delays often lock in an artificially high-cost structure for the product's entire lifecycle.

Less efficient OEMs also struggle with a lack of standardization of architecture, parts, and suppliers, leading to different designs and missed cost-reduction opportunities. For example, one US automaker has only 40 percent commonality between two products on the same platform. That means the company is no more efficient than if it had "just designed these products separately," according to a former chief engineer at a Detroit-based OEM. Such fragmented approaches often originate from design teams working in isolation across borders. Inconsistent design criteria subject component suppliers to fragmented controls and change requests from different OEM teams, resulting in expensive reengineering later on, notes a former industry executive. He adds that new BEV manufacturers prevent unnecessary redesigns by incorporating reusable components and designs that are easily integrated into new vehicles.

Complicating the design efficiency of many traditional automakers is the rise of software-defined vehicles (SDVs). While newer BEV OEMs have developed robust in-house software capabilities, traditional OEMs often depend on multiple external Tier 1 and software suppliers that do not coordinate with one another. This disjointed approach results in a slower and more costly software development and update processes for traditional OEMs compared to their more integrated rivals.

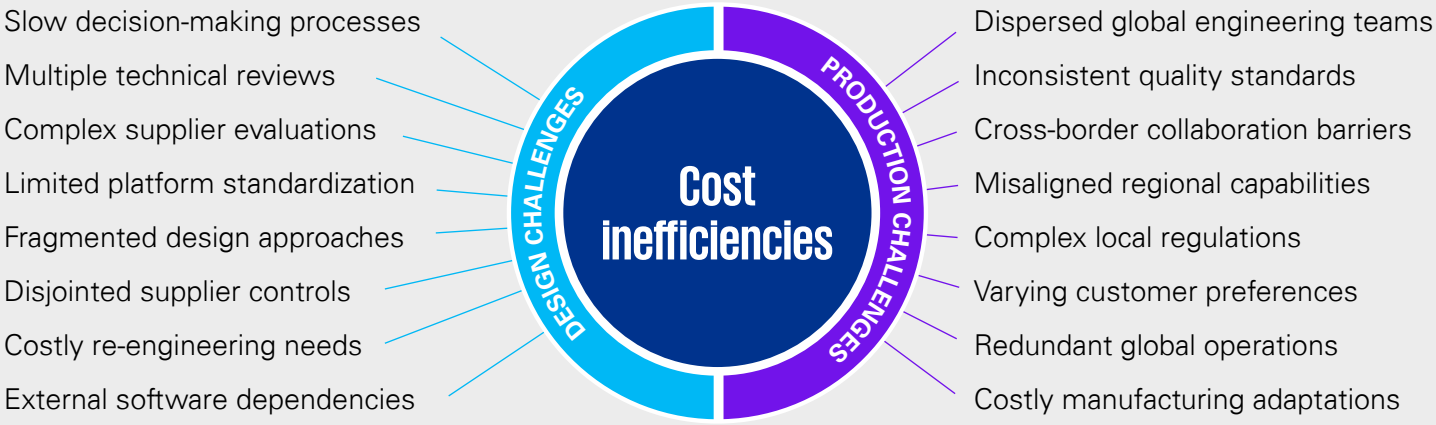
Challenges of global manufacturing complexity

The automotive industry is inherently global, yet achieving cross-border collaboration in integrated manufacturing systems remains a formidable challenge. The dispersion of engineering teams across continents makes it difficult to uphold uniform standards consistently, often resulting in compromises on quality and reliability. Global automakers typically face operational divides, with planning and management teams in Europe, design studios in North America, powertrain development in Asia, and manufacturing platforms in Latin America. This fragmented approach can lead to inefficiencies and inconsistencies that impact overall product integrity.

In such a sprawling organizational structure, many OEMs grapple with determining the appropriate level of control to delegate to local engineers, risking uneven outcomes. Additionally, international engineering teams built up over many years may no longer align with current strategic objectives. For example, a powertrain team in Latin America today might be incapable of delivering the same features as its more experienced counterparts in Europe or the United States. This misalignment can lead to inefficiencies and missed opportunities for cost optimization and resource utilization.

Yet, cars need to be customized to meet local regulations and customer preferences. This introduces inevitable variations in production processes and materials, causing design alterations and additional costs. A former US automotive executive recalls one such case: "[Two models] were designed in Europe, but once they came to North America, they were just overdesigned for the North America customer. The suspension was triple the cost of what it needed to be for North America customers who don't drive on the autobahn."

Common inefficiencies



How to achieve the optimal cost structure

Automakers can lower costs by carefully rethinking how they design cars and run their operations. Key steps include adopting a more standardized approach to design and production, and centralizing engineering tasks. In the era of SDVs, selectively deploying artificial intelligence (AI) may also help streamline operations.

Strike a balance between standardization and customization

OEMs may consider taking a flexible approach to improving the design process, from platform to platform, model to model, and market to market. OEMs rarely succeed in selling the same car globally, making it crucial for them to assess the cost of complexity against the value of offering variety. This involves developing standardized products that can be tailored for different local conditions.For example, a leading Asian automaker anchors new platforms to flagship models and deviates from this standard only if there is a strong business case, such as installing tougher suspensions in countries with bad roads. Teams in different markets can use modular platforms and shared components to make necessary adjustments and add features in response to customer preferences, ensuring lower costs and higher value. Flexibility of the design and production process is crucial.

Nailing the right balance between global platforms and local preferences can reduce the need for complex redesigns for different markets. To maximize cost efficiency, it's advantageous for vehicles to share more commonalities across different markets.

Standardization of products across global operations can lower costs by allowing suppliers to provide the same components and limit the overall number of parts. This can help OEMs build more robust relationships with suppliers, who may benefit from greater production volume and profitability, which may in turn spur more investment in their own tools and engineering. If accommodating certain regions requires excessive adjustments to standard processes, it might be more beneficial to exit those markets rather than bear the costs of increased adaptations and complexity. For these reasons, some OEMs have nearly withdrawn from markets like China or Europe.

Flexibility of the design and production process is crucial.

Meanwhile, more and more OEMs are turning to a software-driven design process using digital twins to increase efficiency.[6] Digital twins are a virtual version of the entire physical car manufacturing production. By allowing engineers to simulate the design process, they can create virtual prototypes of new vehicles and help test new ideas or solve problems before they arise on the factory floor. Smart applications of digital twin technology can accelerate the introduction of new vehicles to the market and enhance quality while reducing manufacturing costs. Software-driven designs can also make diversification across different markets easier.

[6] Tim Stevens, "Twinsies! How digital twin technology is rebooting the automotive world," MotorTrend, December 29, 2023.

Reduce complexity in engineering

Decentralized engineering models foster complexity. Automakers could consider centralizing engineering authority at global headquarters or in a cost-effective, high-expertise location such as South Korea. This approach is particularly beneficial given the automotive industry's requirements for efficiency, innovation, and synchronization across design, development, and manufacturing processes. By allowing regional units to make decisions tailored to conform to local regulations while holding them to stringent global performance standards, automakers can empower local teams to drive innovation and efficiency in vehicle design and production. The aim is to reduce constant oversight by technical leads at headquarters yet establish clear communication protocols and mandatory signoffs for critical changes in engineering processes, such as new powertrain designs or advanced material applications. This approach guarantees that, despite geographic distances, global teams maintain alignment and uniformity in standards, promoting cohesive and efficient operations.

Enlist the power of AI

AI is already transforming automotive products through self-driving and other capabilities. It also offers a powerful lever for OEMs to counteract the root causes of cost efficiencies. Auto OEMs have already applied AI, demonstrating promising early benefits in areas including vehicle design, manufacturing, and back office. In addition, in the current environment, AI could be a powerful tool for tariff impact mitigation as OEMs work at lightning speed to analyze and implement various supply-chain reconfiguration and pricing scenarios.

AI-aided design

Several OEMs are using digital twins with AI in the vehicle design process to reduce design iterations, increase reuse of materials, generate new designs with help from existing design libraries, and incorporate engineering constraints early in the design process.

For example, Toyota has developed an AI-enabled design capability that combines style guidelines entered via text prompts with engineering constraints. This capability reduces iterations and shortens the time it takes Toyota to arrive at a final design.[7] With AI, OEMs can run through several designs and test them before settling on the final design.

Manufacturing

OEMs have embraced AI as an enabler of production improvement, taking advantage of AI skills such as anomaly detection and visual inspection.

For example, some companies are using AI to identify anomalies during the production process to address quality problems early. BMW has developed a solution called Car2X that connects vehicles on the production line to BMW's production systems, utilizing the vehicle's sensors to monitor assembly status and flag quality issues so that they can be addressed in real time.[8]

Predictive maintenance

AI-driven predictive maintenance in automotive manufacturing leverages advanced algorithms and data analytics to forecast vehicle component failures before they occur, aiming to reduce downtime, enhance reliability, and extend the lifespan of the vehicle.[9]

For example, BMW utilizes AI algorithms to predict maintenance needs before they become critical. The vehicle's onboard diagnostics system continuously monitors components and systems, alerting drivers to potential issues and scheduling maintenance proactively. Volkswagen's vehicle health monitoring system uses AI to predict when parts might fail or when maintenance is required.

Back office

OEMs are also applying AI to streamline back-office functions to reduce costs.

For example, Mercedes-Benz adopted AI-enabled contract lifecycle management capabilities to enable a more efficient and effective contract management process.[10]

KPMG LLP has worked with OEMs to improve procurement efficiency, employing AI to automate supplier negotiation and to develop robust materials data needed for procurement analytics.

[7] Matthew Greenwood, "Toyota's new GenAI tool is transforming vehicle design," Engineering.com, September 27, 2023.
[8] "How AI is revolutionising production," BMW Group, November 27, 2023.
[9] "Predictive maintenance with AI: Reducing downtime and costs," CORE BTS, October 2, 2024.
[10] "Mercedes-Benz drives enterprise transformation with Icertis Contract Intelligence," Icertis, June 3, 2025.

The road ahead

As the automotive industry continues to evolve, OEMs need to prioritize greater efficiency through standardization, operational improvement, and innovation to stay competitive. A concerted effort to reduce design and production costs is likely to be paramount, while simultaneously making the transition to a software-first mindset to enhance the customer's connected-vehicle experience may also be necessary. For many automakers, the future may look quite different than the past, but by embracing change, they may be able to move forward more confidently.

How KPMG can help

KPMG brings deep industry experience and well-established methodologies to help organizations enhance their engineering and product development strategies. We assist clients in identifying inefficiencies by benchmarking their design and supplier selection processes against our leading practices. Our teams uncover sources of part proliferation and help drive standardization opportunities for future platforms, reducing complexity and cost.

We support the implementation of global engineering structures that strike the right balance between standardization and customization—enabling agility without sacrificing efficiency. Additionally, KPMG helps organizations develop tailored AI roadmaps and deploy AI capabilities across the enterprise to accelerate decision-making and reduce operational costs.

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