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ANALYSIS OF CHINA'S GROWING COMPETITIVENESS IN THE AUTOMOTIVE INDUSTRY: OPPORTUNITIES FOR COLLABORATION

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Abstract

This paper explores the competitive challenges and opportunities facing the European automotive industry due to the green transition, digitalization, and growing global competition. With the EU's declining global market share, increasing reliance on imports, and slower progress in electric vehicle (EV) innovation, the European sector is undergoing significant shifts. Despite these challenges, the growing presence of Chinese automakers presents opportunities for collaboration, particularly in EV development. By forming strategic partnerships with China and aligning regulatory frameworks, the EU can leverage these opportunities to drive innovation, enhance market competitiveness, and strengthen its position in the automotive sector. Slovenia is highlighted as a case study of how EU countries can benefit from such collaborations, focusing on high-value-added services like research and development, engineering, and advanced manufacturing. The paper argues that through cooperation with China, Europe can address the changing dynamics of the global automotive market, meet its sustainability targets under the European Green Deal, and remain competitive in the automotive industry.

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1 INTRODUCTION

The European automotive industry has long been a cornerstone of innovation and economic growth in the region. With over a century of experience producing vehicles powered by internal combustion engines (ICE), it has established a global reputation for engineering excellence, quality, and creativity (European Parliament, 2024a).

In 2022, the automotive industry contributed 237 billion euros to the European Union's total gross value added. Germany was the largest contributor, with 144.2 billion euros, followed by Spain with 12.8 billion euros, Italy with 12.2 billion euros, France with 11.1 billion euros, Sweden with 11 billion euros, and Czechia with 10.5 billion euros (Eurostat, 2024).

Furthermore, this sector is one of Europe's most research-intensive, with an annual investment of €59 billion in research and development (R&D), equivalent to 15% of its gross value added. Such investment qualifies the automotive industry as a leader in advanced manufacturing and a significant contributor to technological progress (European Parliament, 2024b).

According to ACEA, 213 automobile assembly, engine, and battery production plants were operating in the EU in 2022, an increase from 194 in 2021. Germany had the largest share with 54 facilities, followed by France (31), Italy (23), and Poland (19). Central and Eastern European countries, including Slovakia, Czechia, Hungary, Romania, and Poland, collectively accounted for 47 facilities, reflecting their substantial role in the EU's automotive production network (ACEA, 2023).

The EU's automotive supply chain is uniquely dispersed across multiple Member States, reflecting its integration into the broader European economy. Historically, countries such as Germany, France, Italy, Spain, and Sweden have occupied central roles in the industry. However, since the early 2000s, economic integration has enabled emerging economies in Central and Eastern Europe, including Poland, Czechia, Hungary, Slovakia, and Romania, to take on more significant roles within the value chain. This shift has been driven primarily by the outsourcing of supplier networks and manufacturing from Western European carmakers to these countries, where labor costs are lower and skilled workforces are readily available (Hindriks, Hogetoorn, Zani,, Ravera, & Gelibolyan, 2024).

This distribution is also evident in the employment footprint of the automotive sector across the EU. In 2022, the industry supported 13.8 million jobs. Of these, 2.6 million jobs were directly tied to motor vehicle manufacturing. Germany had the highest level of direct automotive manufacturing employment, with 872,446 jobs, followed by France (214,904), Poland (209,396), Czechia (172,012), Italy (165,218), Romania (159,293), Spain (142,288), Hungary (97,306), and Slovakia (75,721). In many of these regions, automotive production constitutes a significant share of industrial employment. For example, in Slovakia, automotive manufacturing accounted for 15.5% of total manufacturing employment, followed by Czechia (14.5%), Hungary (13.4%), Romania (12.4%), and Germany (10.9%) (ACEA, 2024b).

The broader impact of the automotive industry extends even further. According to the latest report, it now supports approximately 13.8 million jobs across the EU, equivalent to 6.1% of total EU employment, underscoring its importance to the region's workforce (European Parliament, 2024b).

2 CHALLENGES IN THE EUROPEAN AUTOMOTIVE INDUSTRY

Lately, the European automotive industry has faced significant challenges at the crossroads of the green transition, digitalization, and intensifying global competition. Among these, the emergence of China as a dominant player in the global automotive market has profoundly reshaped the competitive landscape, creating both threats and opportunities for European manufacturers (European Parliament, 2024a).

Historically, the United States was the primary market for European automotive exports, contributing over 22% of the total domestic value added in vehicle products as recently as 2015. However, this dynamic has shifted significantly recently, with China overtaking the United States as the largest consumer of EU automotive products (Eurostat, 2024). Furthermore, in 2022, China overtook Germany as the world's second-largest car exporter, disrupting the global automotive market in a manner reminiscent of

Japan's rise in the 1980s and South Korea's in the 1990s (Mazzocco & Sebastian, 2023).

The European Union's automotive sector is experiencing a significant decline in global competitiveness, driven by falling production, increasing reliance on imports, and challenges in electric vehicle (EV) innovation. Between 2000 and 2022, the EU's share of global vehicle production fell from 31%, or 18 million, to 15%, or 13 million vehicles. In contrast, China's share increased from 4%, or 2 million, to 32%, or 27 million cars, as global production expanded from 58 million to 85 million units (European Parliament, 2024b).

An additional challenge is the aging vehicle fleet in Europe. The average age of cars in the EU has risen from 11.8 years in 2020 to 12.3 years in 2022. Further, there are notable differences in the average age of vehicles across Europe. Countries like Ireland (9.1 years) and Luxembourg (7.9 years) have relatively newer fleets due to higher vehicle turnover. In contrast, countries such as Slovenia (11.2 years), Croatia (13.3 years), and Slovakia (13.7 years) experience slower vehicle replacement. Countries like Greece (17.3 years) and the Czech Republic (15.9 years) face even older fleets (ACEA, 2024b).

This decline in production has been accompanied by a significant shift in trade dynamics. Between 2017 and 2022, imports of Chinese vehicles into the EU increased fivefold, reaching 561,000 units. By 2022, China had become the largest non-European supplier to the EU, accounting for 14% of all vehicle imports (European Parliament, 2024b).

Furthermore, most European manufacturers are falling behind in electric vehicle innovation due to high battery costs and slower technological advancements. Only one of the world's top 15 battery-electric vehicles is made in the EU. Meanwhile, China has become a global leader, with competitive domestic firms expanding to new markets and serving as a manufacturing export hub for multinational companies. (European Parliament, 2024a) China's leadership extends beyond production to EV adoption. In 2023, nearly 60% of new electric car registrations occurred in China, compared to 25% in Europe and 10% in the United States (IEA, 2024).

3 GLOBAL AUTOMOTIVE TRADE

China's import and export data of automotive products further highlight its evolving role in the global automotive industry.

Table 1. Top 5 exporters of automotive products, 2023 (WTO, 2024)

	Value (bn $)	Share in world exports/imports			
Exporters	2023	2000	2005	2010	2023
EU	833	45.4	49.5	46.6	44.6
China	170	0.3	1.1	2.6	9.1
Mexico	158	5.3	3.8	5.1	8.5
Japan	157	15.3	13.3	13.7	8.4
USA	156	11.8	9.4	9.1	8.3

	Annual percentage change			
Exporters	2010-23	2021	2022	2023
EU	3.9	12.8	1.7	19.0
China	14.9	60.2	33.6	37.0
Mexico	8.4	10.5	9.6	22.8
Japan	0.4	11.0	-2.3	16.2
USA	3.5	13.7	9.7	13.3

Table 2. Top 5 importers of automotive products, 2023 (WTO, 2024)

	Value (bn $)	Share in world exports/imports			
Importers	2023	2000	2005	2010	2023
EU	684	36.7	38.8	35.2	36.4
USA	383	29.0	21.9	17.7	20.4
Canada	92	8.0	6.1	5.6	4.9
UK	88	6.8	6.8	5.6	4.7
China	72	0.7	1.4	4.9	3.9

	Annual percentage change			
Importers	2010-23	2021	2022	2023
EU	4.7	11.7	2.1	23.3
USA	5.5	10.0	14.5	16.8
Canada	3.4	17.7	19.0	15.4
UK	3.1	6.9	18.0	24.7
China	2.4	15.0	-7.6	-12.8

The European Union remains the largest exporter of automotive products, with exports valued at $833 billion in 2023, accounting for 44.6% of global automotive exports. However, this share has gradually decreased from 49.5% in 2005, reflecting a decline in its relative position. Between 2010 and 2023, EU automotive exports grew at an average annual rate of 3.9%, with notable recoveries in 2021 (12.8%) and 2023 (19.0%). On the import side, the EU accounted for $684 billion in automotive imports in 2023, representing 36.4% of global imports. This marks a relatively stable position since 2010 (36.7%), with a sharp increase of 23.3% in 2023.

In contrast to the EU's stable but moderate growth, China has demonstrated significant expansion in automotive exports. By 2023, China's exports reached $170 billion, contributing 9.1% to global automotive exports, up from 1.1% in 2005. Between 2010 and 2023, China achieved an annual export growth rate of 14.9%, with substantial increases in 2021 (60.2%), 2022 (33.6%), and 2023 (37.0%). At the same time, China's automotive imports declined to $72 billion in 2023, representing 3.9% of global imports, down from 4.9% in 2010. Consecutive negative growth rates in 2022 (-7.6%) and 2023 (-12.8%) highlight China's growing capacity to meet domestic demand through local production.

This analysis underscores the contrasting trajectories of the EU and China. While the EU retains its leadership in export value, its growth has been moderate compared to China's rapid expansion. Simultaneously, China's declining reliance on imports reflects its increasing self-sufficiency and growing role in shaping global automotive trade dynamics. Although a more detailed investigation into the underlying factors would be beneficial, the presented data is sufficient to highlight China's rapid emergence as a dominant force in the global automotive market.

Regarding to China and the EU's automotive exports and imports, it is also evident that Mexico has shown steady long-term export growth, averaging 8.4%, falling short of China's 14.9%. On the other hand, Japan has experienced minimal long-term export growth, averaging just 0.4%, but recorded a strong rebound in 2023 with a 16.2% increase. The United States has maintained stable export expansion over time, with consistent year-over-year increases and a growth rate of 3.5% from 2010 to 2023. In 2023, U.S. exports grew by 13.3%, maintaining a strong upward trend similar to the previous two years.

On the import side, the United States has demonstrated steady long-term growth, with an acceleration in 2022 and 2023, reaching 16.8%. Among the top five importers of automotive products, the United States recorded the highest increase from 2010 to 2023, averaging 5.5% annually. Canada has shown moderate historical growth, with a sharp rise in imports in recent years, recording 19.0% in 2022 and 15.4% in 2023. The United Kingdom has experienced relatively slow long-term growth but saw a significant increase in imports in 2022 and 2023, reaching 24.7% in the most recent year.

4 TECHNICAL HARMONIZATION

Despite their growing competitiveness and expanding presence in the European automotive market, Chinese automakers face significant challenges, particularly in navigating legal compliance and certification requirements.

By 2030, vehicle manufacturers in the EU will face the challenge of complying with over 100 pieces of legislation covering safety, emissions, energy, materials, data, and security. The absence of a coherent framework has led to excessive reporting, overlapping requirements, and inconsistencies with international UNECE standards (ACEA, 2024a).

The United Nations Economic Commission for Europe (UNECE) standards play a critical role in the global automotive market by establishing uniform regulations that enhance vehicle safety, environmental sustainability, and technological innovation. These standards are particularly relevant in a globalized industry where manufacturers and suppliers operate across multiple markets. UNECE regulations, developed under the 1958 Agreement, provide technical and safety guidelines for road vehicles. Initially focused on Europe, these regulations have expanded to include 64 member countries across Asia, Africa, and Latin America. Each regulation targets specific areas of vehicle design and performance, such as lighting, braking systems, emissions, and advanced technologies like autonomous driving systems (European Commission, 2025)

The Whole Vehicle Type-Approval System (WVTA) allows vehicles certified in one EU Member State to be marketed across the Single Market. Under the WVTA, once a manufacturer secures type approval for a car in one EU Member State, it can be marketed across the EU without additional testing. The certification is granted by the designated type-approval authority, while compliance assessments are conducted by authorized technical services. Globally, UNECE harmonization facilitates international market access. Regulation (EU) 2018/858, introduced in 2020, further tightened oversight and mandated Certificates of Conformity (CoC) for vehicle registration and sales (European Commission, 2025)

To address these challenges, the European Automobile Manufacturers' Association (ACEA) recommends simplifying regulations by grouping them into batches, prioritizing forward-looking rules, and creating a task force to assess the consistency of new laws (ACEA, 2024a).

5 AUTOMOTIVE COLLABORATION

Streamlined harmonization and simplified trade processes could help Europe transform growing Chinese competitiveness into an opportunity for collaboration. Duthoit (2023) argues that if Europe struggles to compete with China in the short term, it could adopt a collaborative approach, much like the U.S. partnership with Japanese automakers in the 1980s. However, he warns that Europe should avoid acting too late. Allowing Chinese investment in European car assembly could create jobs and generate economic value by localizing production.

Gupta (2024) underscores that collaboration and joint ventures with Chinese automakers present a significant opportunity for Europe to enhance its competitiveness and drive innovation. He cautions that protectionist measures are unlikely to offer a sustainable solution. Gupta also points out that some European automakers are already leveraging collaboration to maintain their market position. For instance, companies like Volkswagen and BMW are accelerating their EV programs and forming alliances with Chinese firms, such as BMW's partnership with Great Wall Motors to produce the electric Mini in China.

One of the most recent examples of successful collaboration with Chinese automotive manufacturers is BYD's decision to establish a new energy vehicle production facility in Szeged, Hungary. Announced in December 2023, this facility will be the first BYD passenger car factory in Europe. The investment is expected to create thousands of local jobs, strengthen regional supply chains, and facilitate technological exchange between China and Hungary. This development underscores the growing trend of Chinese automotive firms localizing production in Europe to enhance market access and integration within the European automotive industry (BYD, 2023).

6 OPPORTUNITIES FOR SLOVENIA

Slovenia serves as a prime example of how EU countries can leverage collaboration with China to strengthen their automotive sectors. As Minister Matjaž Han, Slovenia's Minister of the Economy, Tourism, and Sport, emphasized, "*The global automotive industry in particular is interconnected, and through further cooperation, we can create synergies that will benefit all parties involved. We aim to promote partnerships that will combine Slovenia's excellent technical know-how and advanced manufacturing capabilities with the innovative technologies of our international partners. This will not only improve our manufacturing capabilities but also create a vibrant ecosystem for research and innovation*." (Slovenian Ministry of the Economy, Tourism and Sport, 2024)

Chinese companies, such as ATTC, the largest private type-approval company in China's automotive industry, see Slovenia as a key partner for accessing the EU market. ATTC has expressed its commitment to long-term collaboration with the Slovenian government, companies, and laboratories for type-approval of vehicles and components in the EU. Their efforts aim to support the introduction of Chinese products for new energy vehicles, original equipment manufacturers, and intelligent driving suppliers while promoting growth in the Slovenian automotive industry (Slovenian Ministry of the Economy, Tourism and Sport, 2024). This partnership could enable Slovenia to focus on high-value-added jobs in services, such as engineering consulting, research and development, and advanced manufacturing.

However, such collaboration might also present challenges that require careful consideration. Zoltán Peredy et. al. (2022) highlight that Chinese automotive manufacturing has undergone rapid innovation, leading to increasingly automated production processes. This raises concerns that while collaboration may bring technological advancements, it could also reduce the need for extensive local labor, limiting job creation in Slovenia. Additionally, some authors raise further concerns regarding long-term dependencies. To mitigate these challenges, the partnership must carefully balance the needs of both parties and focus on successful long-term collaboration.

7 CONCLUSIONS

The European automotive industry stands at a pivotal moment, facing significant challenges from the green transition, digitalization, and intensifying global competition, particularly from China. These pressures require a strategic response that balances innovation, collaboration, and regulatory alignment. While competition with Chinese automakers presents significant challenges, it also offers opportunities for mutual growth through partnerships and investments.

The analysis identifies several key findings. The European automotive sector has historically been a global leader, contributing significantly to economic growth and innovation. However, it is experiencing a decline in global market share, struggling with EV production, and becoming increasingly reliant on imports. Meanwhile, China has rapidly emerged as a dominant player, now the second-largest vehicle exporter worldwide. Additionally, the aging vehicle fleet in the EU poses challenges to sustainability targets, necessitating an accelerated transition to EVs.

China’s competitive edge in global automotive exports is particularly strong in the EV sector. The country has become the world’s largest producer and exporter of EVs, capitalizing on advanced battery technology, cost-efficient manufacturing, and an integrated supply chain. Leading Chinese manufacturers, such as BYD and Nio, are expanding their global reach by offering high-quality EV models at competitive prices. As demand for EVs grows in Europe, Chinese automakers are well-positioned to meet this demand, further altering trade dynamics in the industry.

Technical harmonization remains crucial for the seamless integration of Chinese vehicles into the European market. Regulatory frameworks, including UNECE standards and the Whole Vehicle Type-Approval System, play essential roles in ensuring compliance, reducing trade barriers, and fostering cooperation between European and Chinese automakers. Simplifying regulations and aligning policies can enhance market access and encourage joint ventures.

The collaboration represents a viable strategic approach, as demonstrated by past trade relations, such as U.S.-Japan cooperation in the 1980s. Some European automakers are already forming alliances with Chinese firms to strengthen their EV production capabilities. These partnerships can foster innovation, create high-value jobs, and enhance overall competitiveness.

Slovenia demonstrates how EU countries can position themselves to benefit from these opportunities. With its strategic geographical location, advanced technical expertise, and strong manufacturing ecosystem, Slovenia has the potential to serve as a hub for collaboration between Europe and China. Partnerships with Chinese firms, such as ATTC, could enable the country to focus on high-value-added activities, including research and development, engineering, and advanced manufacturing. Additionally, Slovenia’s strategic location positions it as a key player in helping Europe achieve sustainability goals by importing affordable EVs from China to regions with aging vehicle fleets. In the future, this could extend to facilitating local manufacturing, following examples of successful regional collaborations in neighboring countries.

Moving forward, Europe’s ability to maintain its leadership in the automotive sector will depend on fostering strategic alliances, simplifying regulatory frameworks, and promoting innovation. These steps are essential for ensuring the sector’s sustainability, competitiveness, and role as a driver of economic growth in a rapidly evolving global market.

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