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The global automobile industry stands as one of the most dynamic and influential sectors in the world economy. In recent years, the industry has undergone significant transformations driven by technological advancements and shifts in consumer behaviours. Key players within the automotive industry in terms of countries include China, the United States, Japan, Germany, South Korea, India, and Mexico (OECD, 2016). Worldwide vehicle sales were predicted to exceed up to 110mn units in 2022 driven by demands in China with lesser extents in India. Both countries are primary drivers of sales growth in the industry, with China evolving to become a global player in automobiles with more than half the global capacity of lithium-ion batteries produced in China. Some factors that will impede further sales include the decelerating economic momentum, tightening financial conditions and the growing second-hand market. Challenges faced within the industry that will diminish future financial opportunities are manufacturers and suppliers transitioning to electrical vehicles (EVs), the cost of EVs for households, data security and protectionism with regulations (Allianz 2018). Currently, on the roads, there are electric vehicles (EVs), hybrids, autonomous vehicles, and conventional gasoline or diesel-powered cars, with the addition of car sharing and car free-floating services. This report aims to explore how both technological change and changes in consumer behaviours are expected to impact the global oligopolist automobile industry.

Industry reports indicate that technological changes in the automobile industry are fostering greater collaboration among automotive companies, as well as with digital and technological corporations which have never been done before. This is to tackle challenges posed by advancements in technology. This underscores the recognition of the imperative to collectively adapt to technological shifts to remain competitive in the market and reap profits. For instance, Honda, known for its preference for proprietary technology and in-house engineering, has partnered with General Motors' Cruise Automation unit to develop autonomous vehicles (AVs) (PWC, 2019).

Additionally, there has been a surge in EV startups and partnerships with digital giants to explore mobility solutions, with a significant shift towards a focus on electrical propulsion technology to address sustainability and environmental concerns, alongside increased investments in self-driving cars. Moreover, the decline in diesel market share and tightening emission regulations are putting pressure on automakers to adapt to such changes (Allianz, 2018). This will have a significant impact on the automotive industry, adoption of electric

vehicles is predicted to increase substantially in the next decade. This will be driven by improvements in battery technology and environmental concerns, with the addition of making it more cost-effective for consumers (OECD, 2016). Furthermore, the EU's ban on the sale of petrol and diesel cars from 2035 onwards could serve as a catalyst for industry-wide transformations. In the future, the cost of owning such cars which are not environmentally friendly and have higher costs due to the use of unrenewable fuel would be undesirable to consumers (European Parliament, 2022).

Although it will take time for widespread adoption, the switch from mechanical to electronic systems in cars represents a substantial technological advancement and is considered a long-term solution to emission targets. This encompasses innovations such as security systems, anti-lock brakes, engine control units, and infotainment systems. However, the digitalisation of cars may also bring about negative consequences, such as sensitivity issues on the car's interfaces. This will affect the post-purchase consumer experience. The increasing incorporation of electronic components in vehicles reflects the industry's responsiveness to consumer demand for technology-enhanced driving experiences. Original equipment manufacturers (OEMs) and suppliers must prioritize technology development aligned with consumer preferences, decision-making processes, and willingness to pay for advanced features (Deloitte, 2020).

Furthermore, technology impacts will make automakers streamline automation processes in their factories, necessitating attention to recruitment, training, and overall human resources. This will be needed to ensure employee motivation, effectiveness, and communication within the organisation are integrated. In addition, new employees will require digital orientation, potentially worsening the shortage of digitally skilled individuals across industries. On top of this, to keep pace with design and technological advancements, the duration between research and development and production may be reduced from the current three to five years to approximately two years. Lower-level routine decisions and administrative tasks may be delegated to artificially intelligent robots. There is a possibility that future automakers will hypothetically segregate into two categories: highly automated "plug and play" plants catering to the mass market with minimal variation in car types, and those producing customized, high-end cars for markets encompassing but not limited to markets for combustion engines, electric vehicles, and autonomous vehicles. This brings on the question of what automakers will separate into which category within this oligopolistic industry and

how will they position themselves within this evolving landscape. Despite these changes and challenges, future automakers must prioritize the evolution of their factories to control expenses and optimize operations (PWC, 2019).

As technology continues to revolutionise, advancements in onboard AI, data-driven services, and advanced safety features within automobiles, which have profoundly impacted society, will also entail risks, notably cybersecurity risks and regulatory concerns. OEMs, suppliers, and companies will gain greater access to information about drivers and passengers, facilitating more targeted customer outreach and fuelling growth in the automotive aftermarket, with increased utilization of online services. This will offer consumers more options for personalizing their vehicles by generating a market for after-sale upgrades and services, akin to the market for smartphone accessories and applications. However, these developments also pose risks, such as potential leaks of consumer information due to cybersecurity breaches or cyberattacks, which could lead to lawsuits against companies. Therefore, such handling of data would possibly need additional regulations put in place concerning a consumer's GDPR (General Data Protection Regulation). This underscores the critical importance of robust cybersecurity measures to safeguard customer privacy and ensure the security of connected vehicles. The software end-of-life cycle of their vehicles is something that automakers must consider. Since the process of locating and fixing some software flaws will have ceased, outdated products are more likely to be susceptible to security flaws and hackers (Thomson Reuters, 2018).

About 90% of accidents are currently caused by human error, but autonomous cars with crash-prevention software are soon to be a thing. This can revolutionise road safety and transportation efficiency, as this would mean there would be some or no crashes at all. There would not be a need for traffic guards or police to ticket drunk drivers. From this, vehicles with safety features like crumple zones, bumpers, and airbags could be eliminated. Original equipment manufacturers (OEMs) could greatly streamline car production, making vehicles much lighter and, consequently, less costly to purchase and operate or add previous safety features as an additional feature for consumers to choose from. Regulations on such road safety would have to be revised among countries. Furthermore, related industries could be affected as well. For instance, car insurance would still be required for events like theft, vandalism, and disasters, but claims for car accidents might almost completely disappear. Additionally, as collisions decrease, automobile lifespans may increase (OECD, 2016). From

such technological revolutionization, jobs and regulations as we know it will transform to create and provide for such advancements.

Since more cars are produced annually worldwide and 90% of global production is concentrated in the top 20 countries due to the industry's high level of concentration. Countries leading such dominance within the industry can influence market trends, dynamics, technological innovation, economic impact, regulations, and the competitive landscape within the industry along with social, cultural, and environmental impact. These countries can gain more foreign direct investment than others which can increase their capital inflows, which can assist a country in financing its infrastructure improvements and development projects. However, policymakers must carefully manage and regulate FDI to maximise its positive impacts while addressing potential risks and challenges (OCED, 2016). Such decisions must be made to ensure flow within the economy.

Moreover, threatening trade policy decisions could possibly be placed like tariff adjustments, which can have implications for the automotive industry. For instance, U.S. vehicle import tariffs to the EU could be subject to a 10% tariff, while tariffs the other way stand at 2.5%. These actions could lead to increased prices, reduced reliance on imports, and potential disruptions to intricate supply chains. European automakers, renowned for their complex networks sourcing components from various countries, including the U.S., might encounter financial setbacks and find themselves at a competitive disadvantage in the global market. An additional risk lies in a trade escalation scenario with China, which has retaliated against U.S. tariffs by increasing tariffs on vehicles made in the U.S. to 40%, thereby diminishing the competitiveness of U.S. automakers within the Chinese market. There are possible predictions that decelerating global trade in automobiles could affect China's export-driven automotive industry, potentially impacting production levels and economic growth, while also limiting U.S. automakers' access to international markets and affecting their profitability.

The impact of tariffs could reshape market dynamics, slow down-market growth, and influence consumer behaviour, affecting their purchasing decisions regarding price sensitivity, perceived value of imported products, and brand loyalty. As each country's automobile companies pivot towards more profitable markets to offset declining sales, increased competition in other regions could disrupt supply chains and networks (Allianz 2018).

Today, Consumer preferences are increasingly driving demand for innovative features and services in vehicles. Collaboration and platform strategies, involving partnerships and alliances to accelerate developments and share risks, can assist automotive companies in meeting consumer preferences. According to OCED (2016), such preferences include smaller, lighter cars and shared mobility solutions, driven by urbanization trends and environmental awareness. By 2025, this is likely to necessitate revisions and adjustments to product portfolios, business models, and organizational structures (Deloitte, 2017).

Currently, there is a discrepancy between consumer expectations and the actual adoption rate between hybrids, EVs and autonomous vehicles as automakers have a lower ROI than expected from their investments. Looking ahead, automakers must consider consumer behaviour in emerging markets, where rising personal income levels but low discretionary income impact the demand for low-cost, low-tech vehicles. even amidst technological advancements, prompting carmakers to find ways to make greener and technologically advanced cars price-compatible with traditional internal combustion engine vehicles (Deloitte, 2020).

According to McKinsey (2020), consumers are becoming increasingly reliant on the Internet to become informed about the car buying process, reducing the number of visits to car dealerships before making a purchase. This has shifted the number of visits to car dealerships before making a purchase and highlights the importance of a strong online presence for car manufacturers coupled with strong data security and privacy services embedded within them.

Another factor influencing consumer behaviour is the rise in car-sharing companies. Potential alliances between OEMs and these companies could further promote EVs in the market and familiarize consumers with them. Changes in consumer behaviour include the concept of consumers intent on keeping their cars longer, requiring automakers to allocate more resources to maintaining and updating their models. Additionally, there's a growing preference for using cars rather than owning them. This is reflected in the popularity of car-sharing and ride-hailing services. Nowadays, many cities now consider car-sharing services more economical than individual vehicle ownership (Thomson Reuters, 2018).

Car-sharing comes in various forms, including station-based and free-floating, each with its distinctions in availability. Station-based car sharing involves vehicles being picked up from designated stations, while free-floating car sharing reflects on the supplier's business area. On

the other hand, ride-hailing involves sharing a journey, facilitated through websites acting as brokers for private vehicle trips, online car-sharing services building driving communities, and companies providing taxi services via apps (PWC, 2018).

In conclusion, the global automobile industry undergoing rapid transformation and will change within a decade compared to now. This is being profoundly influenced by both technological change and shifts in consumer behaviour. Technological advancements, including the rise of electric vehicles, enhanced connectivity, and the growing significance of software and electronics, are intricately intertwined with changes in consumer behaviour towards online research, convenience, and shared mobility. These factors collectively shape the trajectory of the global automobile industry. To thrive in this dynamic environment, the industry must prioritize collaboration, innovation, and responsiveness to consumer needs. By embracing technological advancements, addressing regulatory concerns, and meeting consumer demands for sustainable mobility solutions, the global automobile industry can continue to prosper in the future. However, there is the underlying question of how various consumers will adapt and perceive such changes along with automaker's reactions.

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