UDC 330

E-MOBILITY INDUSTRY IN CHINA

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Abstract. Nowadays, China is also the most significant market for the automotive industry, which is in large part due to the number of people living in China and the growing middle class, especially within the last two decades. When it comes to E-mobility, China has become even more relevant. The country is home to many electric car manufacturers, which are, among others, most successfully producing cheap microcars.
Key words: China, e-mobility, electric vehicles, environment, economics.

ИНДУСТРИЯ ЭЛЕКТРОННОЙ МОБИЛЬНОСТИ В КИТАЕ

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Аннотация. В настоящее время Китай также является наиболее значительным рынком для автомобильной промышленности, что во многом обусловлено количеством людей, живущих в Китае, и растущим средним классом, особенно в течение последних двух десятилетий. Когда дело доходит до электронной мобильности, Китай становится еще более актуальным. Страна является родиной многих производителей электромобилей, которые, среди прочего, наиболее успешно производят дешевые микроавтобусы.
Ключевые слова: Китай, электронная мобильность, электромобили, окружающая среда, экономика.

Introduction

The magnitude of the electric mobility market in China, the largest in the world, presents a significant opportunity for global car manufacturers. On the flip side, the industry is also the most powerful in the world, which results in a high initial level of competitiveness. Moreover, international car manufacturers also want to gain market share in China. This paper will shed light on the opportunities the Chinese market. This paper is organized in such a way that it will begin with an overview of market for electric vehicles (EVs) in China.

China's economy grew enormously since 1978 when the country opened up to international trade under the reign of Deng Xiaoping. On average, the GDP increased by almost 10 % each year from 1978 onwards, making it the second-largest economy in terms of overall GDP in 2020 (theworldbank, 2020a). In 2020 over 80 % of China's GDP was generated by the manufacturing and service sector (theworldbank, 2020b). Those sectors depend highly on large numbers of people and high workforce productivity. That's why urban areas are mostly the home to those two sectors. Therefore, it is no surprise that China's urban population has grown enormously. From 2010 to 2020 alone, the number of urban residents increased by 230 million (Statista, 2021a). However, due to that rapid urbanization phenomenon, many issues became apparent. Not

only are Chinese cities amongst the most polluted, but they are also facing high traffic congestions (ChinaPower, 2021). Thus, China is one of the target markets and the most critical market for EVs (McKinsey, 2020, pp. 3-5).

The authors made an effort to present a reader with a fundamental comprehension of China's E-Mobility industry. The authors, however, will only be able to write about the aspects of China's past, present, and future economic development that are considered to be the most important. This is because the subject matter as a whole is rather complex. Regarding the E-mobility industry, the authors researched various aspects, including the size of the market, the number of sales, and the active businesses in this sector.

When discussing electric vehicles, it is also essential to bring up the fact that this paper uses several different terms, some of which may share the same meaning as others. Electrified vehicles can be referred to as PEVs, PHEVs, or BEVs, which stand for plug-in electric vehicles, plug-in hybrid electric vehicles, or battery electric vehicles, respectively. One term that is used as a general term for all vehicles that are electrified or fully electric is "New energy vehicle." This term has become increasingly common in recent years. The authors consider this to be critical, however. This is because virtually every single automobile that possesses a battery of any size that is capable of being marginally recharged when the vehicle is braking (recuperation) can classify itself as a new energy vehicle, even if the automobile is still equipped with an internal combustion engine, albeit one that has slightly reduced fuel consumption.

Research question, methods of work, and research approach

To simplify the rather complex research situation of this paper, it will be split into five different parts:

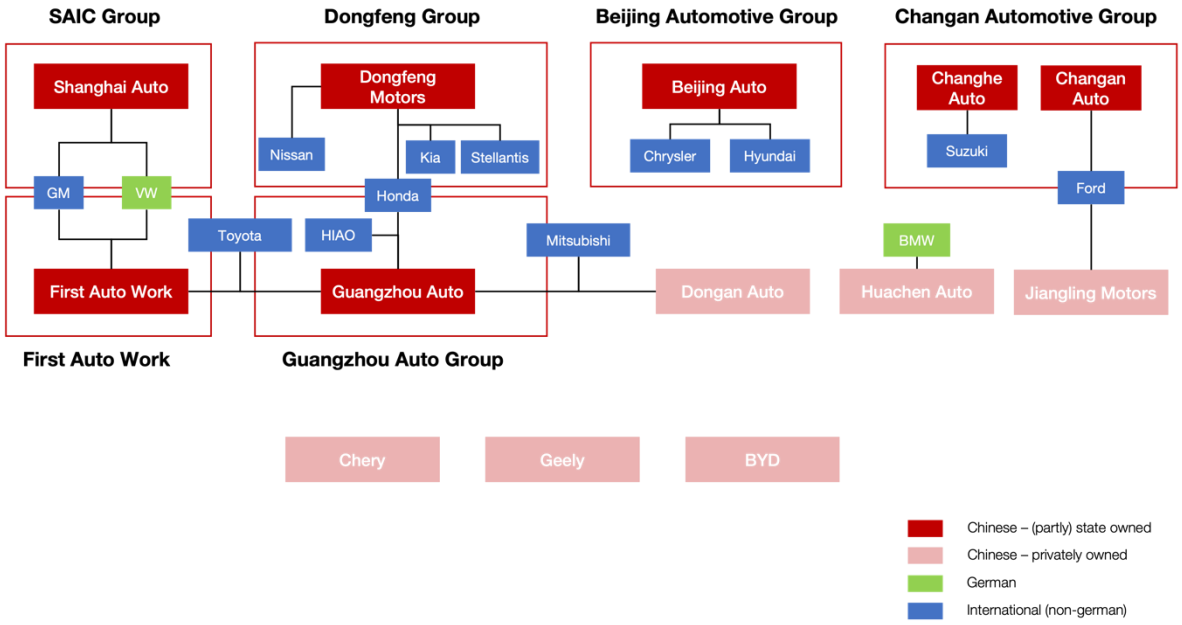
- Structure of China’s automotive sector
- Comparison with other countries
- Importance of EVs for China from an economic point of view
- Importance of EVs for China from an environmental point of view
- Government strategies that support the E-mobility industry

The authors use a mixed-method approach consisting of a descriptive analysis of available literature and data.

Structure of China’s automotive sector

As a result of the rapid pace of its economic development, China has emerged as a significant market for automakers from all over the world. On the other hand, selling automobiles in China is not as straightforward as it would be in western countries, as the Chinese government has a significant interest in expanding its domestic automotive industry. As a consequence of this, they came to the conclusion that foreign automotive companies needed to establish joint ventures with Chinese firms to manufacture cars in China. At this point in time, almost all the world's most prominent automobile manufacturers have active joint ventures in China. In addition, the majority of China's most successful automotive manufacturing companies are at least partially owned and operated by the state (Chen et al., 2020, pp. 1-3). The ownership structure of some of the most significant Chinese companies operating in this industry is depicted in Figure 1, along with the relationships between those Chinese companies and international companies in terms of joint ventures. Tesla, which is not shown in the graphic, is an exception in the Chinese automotive industry because they have a license to produce cars by themselves in their so-called Giga Factory in Shanghai, China. This distinction allows Tesla to compete directly with other automakers in the Chinese market (east-west center, 2022). It is not entirely clear why this individual company is given such privileged treatment. However, Tesla is widely regarded as the market leader in the field of electric mobility; consequently, the interest of the Chinese government to get a prestigious company manufacturing in their country could have been more important than any other consideration.

Figure 1. The structure of China's automotive industry and the present joint ventures



Source: Chen et al., 2020, p. 2), adapted from source.

Nevertheless, it is essential to keep in mind that China is still working toward developing its automobile brands and the ability to manufacture high-quality automobiles independently, without the assistance of companies from the West. However, there is little to no doubt that the established automotive companies in western markets are still in the lead in manufacturing automobiles. This is primarily due to the know-how that these companies have when it comes to combustion engines. On the other hand, the growing concern around the world about the effects of human activity on the environment is shifting the focus toward electric motors and batteries. China views this trend as an opportunity to become a global automotive leader by focusing on battery technology and other related areas, such as autonomous driving. Moreover, China has an advantage in the supply chain regarding the resources needed to produce batteries, specifically lithium and cobalt, as was already discussed in earlier chapters.

One Chinese company which already established a strong EV brand is the Shenzhen-based BYD (Build Your Dream). They sold the second most electric vehicles globally in 2021; only Tesla was able to sell a higher number.

Comparison with other countries

China is by far the largest market for electric vehicles, about 40 % of the world's electric cars are driving in China in 2020 (Battery electric and plug-in hybrid vehicles combined). In absolute figures, China sold 1.16 million new energy vehicles in 2020. In comparison, in Germany, which is in second place in market share, sales amounted to 395,000 (statista, 2021b). Moreover, according to the Roland Berger E-mobility index 2021, China is the leading country in E-mobility, followed by Germany and France, with an incredibly dominant position in the industry (Roland Berger, 2021, pp. 5-6).

Popularity for new energy vehicles in China is, on the one hand, due to the large offer for consumers, especially from domestic companies, and on the other hand, because of generous government subsidies supporting purchases of new energy vehicles. What is more, several cities in China, like Shenzhen, Shanghai, and Beijing, face severe problems with air pollution. Therefore, they made it financially less attractive to buy an ICE (internal combustion engine) car, as the mandatory license plate is only given away through a lottery, with low chances of winning (less than 5 %) and highly-priced – Shanghai average winning bid in 2018: ~13,000 US$. For electric cars, in contrast, it is mostly free of charge (the economist, 2018). Furthermore, the government also sets specific quotes for car companies regarding the sales of new energy vehicles. Car manufacturers are required to have a share of 16 % of which in 2022. By 2023 this number will increase to 18%. If an enterprise cannot meet that target, penalty fees must be paid (Schaal, 2020).

However, the share of new energy vehicles out of China's total car sales is still relatively low for the year 2021 (about 15 %), compared to many developed markets like the United Kingdom (18.6 %) or Germany (26 %). However, considering GNI per capita (PPP), which is almost 3.5 times higher in Germany than in China, it can be said that the popularity of new energy vehicles is exceptionally high among Chinese consumers, even though purchasing power is relatively low (theworldbank, 2020c). This could be due to a combination of high environmental consciousness, government actions, and campaigns, as well as a lower average price of those vehicles, which is with $ 22,000, approximately half of the average price in Europe, which is $ 42,500 (pandaily, 2021).

Importance of EVs for China from an economic point of view

China is the most important country for electric vehicle battery production; it accounted for about 45 % of the global market in 2021 (Venditti, 2021). As it can be expected that global sales of BEVs will dramatically increase in the following year's Chinese battery firms will take advantage of that.

Batteries for electric vehicles are generally made from Nickel, Cobalt, and Lithium. Speaking about the latter and most important material for Li-ion battery production, China ranks number 3 in the mining of which (after Australia and Chile) (US. Department of the Interior, 2022, p. 101). However, the composition of materials might change in the future with potential new battery technologies. Even though China is the market leader right now and is expected to stay in that position for the next few years, there is a possibility that developed economies are putting greater emphasis on research and development for battery technologies. The EU, for example, has already introduced plans for expanding its battery industry due to the strategic importance (Linklaters, 2019, p. 11).

Not only is China number one in battery production, with the company CATL being the most successful in this field on a global basis, but there are also highly successful companies that produce Battery electric vehicles, like BYD. Looking at the number of companies operating in China's overall E-mobility market, there are over 300,000, of which 78,600 were added in 2020 alone (Cheng, 2021).

Importance of EVs for China from an environmental point of view

With rapid urbanization and industrialization, China also experienced negative environmental consequences, like air pollution. Personal and commercial transport is still one of the strongest drivers of the greenhouse gas effect, accounting for about a quarter of all CO_2-emissions worldwide (Xingpu & Haicheng, 2021, p. 2). Therefore, electrifying mobility, together with renewable energy sources, will be essential for China to improve the environmental situation in the country. China also has an ambitious strategic goal concerning carbon neutrality, aiming to achieve its peak in carbon emissions by 2030 and reach net zero emissions by 2060.

However, as China is still an emerging market, which is highly correlated with less consumption, the country's CO_2 per capita emissions are 7.35 metric tonnes CO_2, meaning considerably lower than the ones in developed markets like Germany (8.5) or the United States (15.2). Nonetheless, it must be considered that the United States has a GDP per capita that is almost six times as high as the one of China in 2020, while only accounting for double the CO_2- emissions per capita (the world bank, 2020h). Overall, China is also the world's largest emitter of CO_2. In contrast, China has a higher share of electricity production from renewable energy sources than the United States (29.02 and 20.44 respectively) (Our World in Data, 2020).

Government strategies that support the E-mobility industry

This section deals with China's strategic plans, which could foster the development of the E-mobility industry.

Made in China 2025 strategy plan

The government of China aims to become the leading technological superpower by 2049, the 100th anniversary of the people's republic of China. In order to achieve this goal, China's current president Xi

Jinping launched the Made in China 2025 strategy plan, where ten core industries, among which E-mobility, are mentioned, in which China wants to become number one. China is already the market leader in EV batteries (Kennedy, 2015).

China is aware that the next-generation IT companies are an excellent chance for the country to beat foreign competitors like the United States or Europe. In terms of those technologies, Chinese companies highly benefit from the affinity of Chinese consumers to new digital service offerings and products in general (Deloitte, 2010, p. 8). Looking at mobile payment, for example, China is far ahead regarding the share of users using mobile payment regularly (Zenglein & Holzmann, 2019).

However, due to the structural and demographical issues China will face in the future, it is unlikely that China will surpass the United States as the economic superpower by 2049. Nonetheless, China will most certainly play a vital role in the world economy, and its economy could keep on growing at a faster pace than developed markets while being lower than in the previous year's (Dollar et al., 2020, pp. 6-7).

China's new energy vehicle industrial development plan for 2021 – 2035

This strategic plan focuses explicitly on the market development of new energy vehicles in China. Its overarching goal is a share of 20 % of new energy vehicle sales by 2025. What Is unique about that plan is that it also includes related industries to the automotive sector, like the energy and information and communication one (icct, 2021, pp. 1-2).

According to a study conducted by McKinsey, China could reach a market share of 52 % of electric vehicles in the light vehicle market, considering an optimistic scenario. On the other hand, Europe would arrive at 44% and the United States only at 36%. As of 2020, the market share is 7 % in China and Europe and 3 % in the United States (McKinsey & Company, 2020).

However, China is well aware that it comes down to an interplay between various industries to sustain a globally competitive E-mobility industry. Another interesting change in this strategy is shifting from direct subsidies (i.e., a certain amount subsidized by the government when buying a NEV) to a tax reduction approach. In addition, R & D investment incentives for companies should be provided by (icct, 2021, p. 6).

Research discussion

China is, undoubtedly of extremely high importance in today's world. However, this was not always the case. The pace at which a country of the size of China was able to grow economically has never been seen before in the history of humanity. Looking back 50 years ago, China was a poor country, dependent on agricultural production, and far away from having a relevant automotive industry, let-alone consumers who would be able to afford cars.

However, things changed when Deng Jiao Peng opened China to international trade in 1978, which also made foreign direct investment possible. Now in 2022, we are referring to China as the second-largest economy in the world, with an essential contribution to the functioning of global markets. Nevertheless, China's plan to build a strong automotive industry was at first not able to be realized. This is largely due to the competitive advantage international automotive companies, especially the German ones, had. Germany has a history of over a hundred years of car manufacturing and, more importantly, internal combustion engines. However, global concerns about environmental issues have led the world to believe that internal combustion engine vehicles should no longer be focused on. Instead, battery electric vehicles should become the most important automobiles of the future. Here China saw an opportunity to catch up with international competitors. Not only does China have many companies which are having expertise in battery manufacturing, but China also has a supply chain advantage when it comes to the natural resources which are required for batteries, which are, for example, Lithium and Cobalt, in the case of the most well-known and used battery type, the Lithium-Ion battery.

As China was able to recognize the chance they are having, which was provided by the boom in electric cars, the country chose to introduce strategic plans, where target numbers of new energy vehicles on China's roads in 2025 are specified (20% share). But not only that, China also has regulations regarding automotive companies and their share of electric cars they are producing. In concrete terms, this means that if an automotive company is not producing a particular percentage of electric vehicles, penalty fees must be paid. Furthermore, in major cities of China, there is a so-called license plate policy, which means that if a consumer wants to buy an internal combustion engine car, a high amount must be paid for the license plate, i.e., the permission to drive the car in the city. While on the other hand, the license plate is primarily free of charge for electric vehicle owners.

Moreover, China is the world's largest producer of greenhouse gases. Not only that, but Chinese cities are also among the most polluted cities in the world. Those environmental problems apparent in China are probably also reasons why the country's government is putting so much effort into electric vehicles.

The result of these implications is that China is the world's largest market for electric vehicles as of today. Chinese firms are also among the largest producers of cars. BYD, a Chinese electric vehicle manufacturer, was the EV company with the second-highest number of sales of pure battery electric vehicles in 2021. When it comes to electric buses, BYD is the global market leader. However, BYD is probably only known to a few individuals in the western world.

The strongest industry for electric vehicle batteries, combined with government ambitions to focus on key industries of strategic importance in the future, i.e., the E-mobility industry, China is for sure a core target market for the ACM City One. This paper is important for understanding of the current and future situation of China's E-mobility industry and consumer preferences.

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