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# Comparative Advantages Analysis: Car Manufacturing in Germany and South Korea

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**Abstract.** In Germany and South Korea, both countries have comparable strengths in the automotive manufacturing industry and both have a significant position, contributing greatly to GDP growth, employment, and upstream and downstream industries. This paper analyses the advantages of South Korea and Germany through the Porter's diamond model, analysing six aspects: factor conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry, government and chance. The result showed that Germany has invested heavily in research and infrastructure, while South Korea is better in responding flexibly to the world's turbulent situation and in the field of new energy vehicles.

**Keywords:** Porter's Diamond Model; Car Manufacturing Industry; Germany; South Korea.

## 1. Introduction

Cars have made life easier [1]. As the automotive manufacturing industry matures, the automotive industry in various countries is progressing slowly and even tends to decline in sales. This paper will outline the situation within the automotive manufacturing industry. It will analyse Germany and South Korea's excellent performance in the automotive manufacturing industry mainly through the Porter's Diamond Model, point out their problems and the challenges they are facing now and, in the future, and give solutions to help the development of the automotive industry in both countries.

## 2. Overview of Car Manufacturing Industry:

Back in the 1980s, the market share of the automotive manufacturing industry was able to expand due to globalisation. Later, because of the financial crisis, the demand for cars plummeted and there was overcapacity in production [2]. Nowadays, the automotive industry has entered a competitive phase where countries are researching new energy vehicles and autonomous driving to attract customers. From a time perspective, according to Figure 1, Compound Annual Growth Rate (CAGR) can be calculated to be 0.06%, which indicates that the industry is relatively mature and competitive. The overall revenue situation of this industry is less favourable than a decade ago, especially in 2020 when it was affected by the new crown epidemic. Offline retailing has been hit and coupled with tense import and export policies in various countries, revenue has declined significantly. From a country perspective, Germany, an established automotive manufacturing powerhouse, and South Korea, a rising star, have similar revenues and vehicle production. Both countries occupy an important position and the different directions of the two countries facilitate better complementary analysis and recommendations.

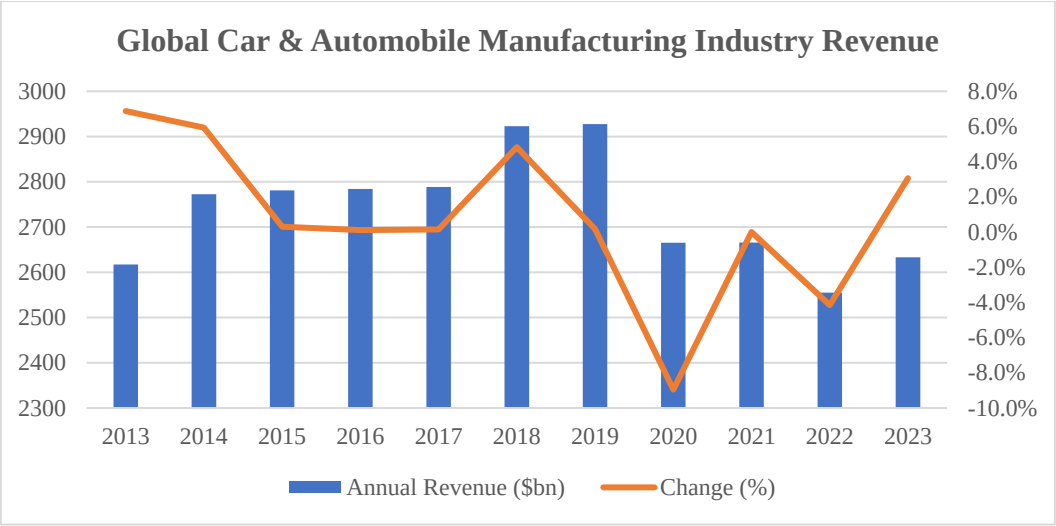



**Fig. 1** Global Car & Automobile Manufacturing Industry Revenue [3]

Source: IBISWorld, 2024

## 3. Overview of Germany and South Korea:

As the number one car manufacturing country in Europe, Germany's automotive manufacturing industry is at the heart of the country's economy, accounting for as much as 5 percent of Germany's GDP year after year. Considering the perspective of turnover, according to Figure 2, the automotive industry is by far the strongest industrial sector in Germany in terms of turnover. The turnover of the automotive manufacturing industry is as high as 438.8 billion euros, far behind the second-largest machinery industry with a turnover of 257 billion euros, a huge gap in turnover that further underlines the dominant position of the automotive industry in the German economy. From the employment point of view, the German automotive manufacturing industry provides 833,000 jobs. After the machinery industry, it ranks second in Germany. However, the salaries in the automotive manufacturing industry far exceed those in other industries, ranking first in Germany, highlighting the demand and importance of this industry for highly skilled labour in Germany. In terms of R&D spending, the automotive industry accounts for 37 percent of Germany's total economy, far ahead of the second place. It demonstrates the importance that Germany attaches to the automotive industry [4]. As a result, the automotive manufacturing industry has a significant impact on the German economy. For the significance of the German automotive manufacturing industry, the history of automotive development, government support, innovation, and R&D capability are essential.

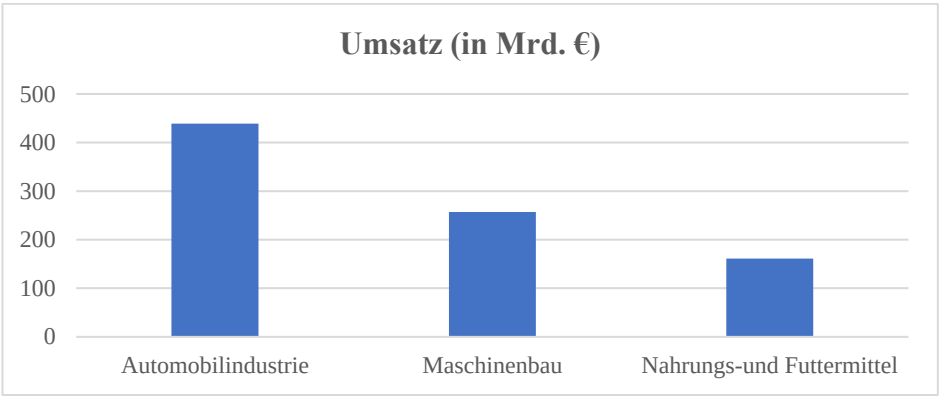



**Fig. 2** Umsatz (in Mrd. €) [4]

Source: VDA, 2020

South Korea's automotive manufacturing industry is a significant contributor to economic growth. South Korea has been praised as the fastest-growing automotive industry in the world after World War II [5]. It is a very important industrial area that boasts significant contributions toward major

economic indicators such as manufacturing output, value added, and total employment in South Korea. Exports of these bring in a lot of foreign exchange earnings for South Korea. According to Figure 3, the number of exports was affected by external factors, namely the financial crisis and COVID-19. In the late 1990s the impact of the Asian Financial Crisis and in 2009 the impact of the world financial crisis, the Korean automobile manufacturing industry suffered from these two crises. Since the 2020 epidemic, Korean automobile manufacturing exports have been gradually moving towards a positive trend. From 2002 to 2007, and again from 2020 to 2022, Korea's automotive exports have grown substantially and have simultaneously affected other domestic industries, ranging from materials such as steel, nonferrous metals, and glass to transportation, advertising, financial services. Undoubtedly, it has a great impact on brand awareness and upstream and downstream industries. It has played a key role in the growth of the Korean economy.

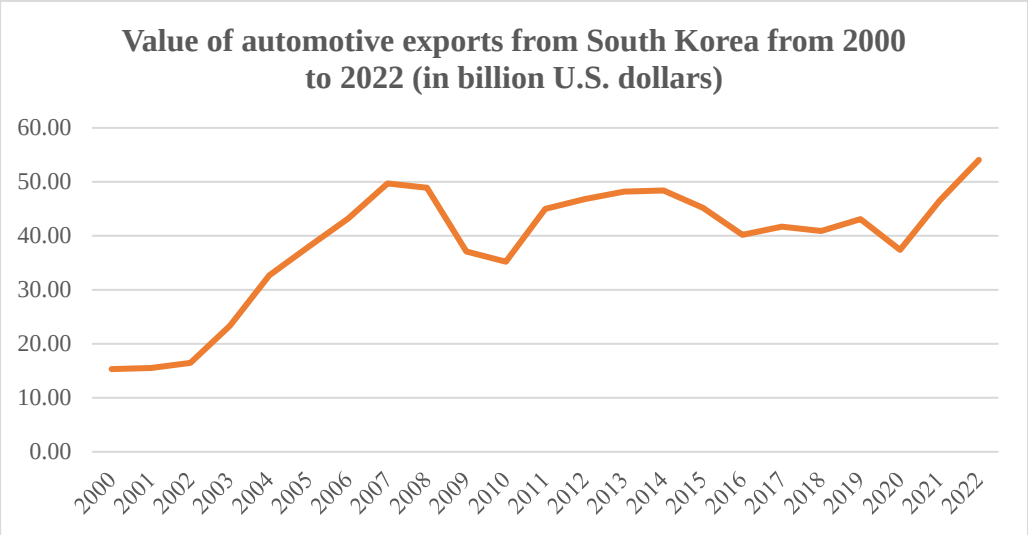



**Fig. 3** Value of automotive exports from South Korea from 2000 to 2022 (in billion U.S. dollars) [6]

Source: Statista, 2023

## 4. Porter's Diamond Model---Comparative Analysis of National Competitive Advantage in car manufacturing industry:

According to the diamond model, a country's competitiveness is largely determined by its ability to innovate and upgrade its industries, and whether a country's particular industry has a competitive advantage depends on six key factors, factor conditions, demand conditions, related and supporting industries, structure of firms and rivalry, in addition to government and chance factors. The four key factors form a quadrilateral, and together with the two external factors of opportunity and government, the six factors interact with each other to form the "Porter's Diamond Model".

### 4.1. Factor Conditions

German automotive companies emphasise a robust leadership style where they place more emphasis on globally standardised operating procedures and control systems, responding to different situations in a standardised way. Korean automotive companies are dominated by Hyundai Motor Company and Kia Motor, in contrast, which are influenced by Korean cultural factors, they have a more entrepreneurial leadership style, where leaders place more emphasis on monitoring environmental changes and catching them quickly at the right time [7].

Germany spends much more on R&D than South Korea, even twice as much, which is a good indication of the high emphasis on technological R&D to bring better performance and a better experience to the vehicle.

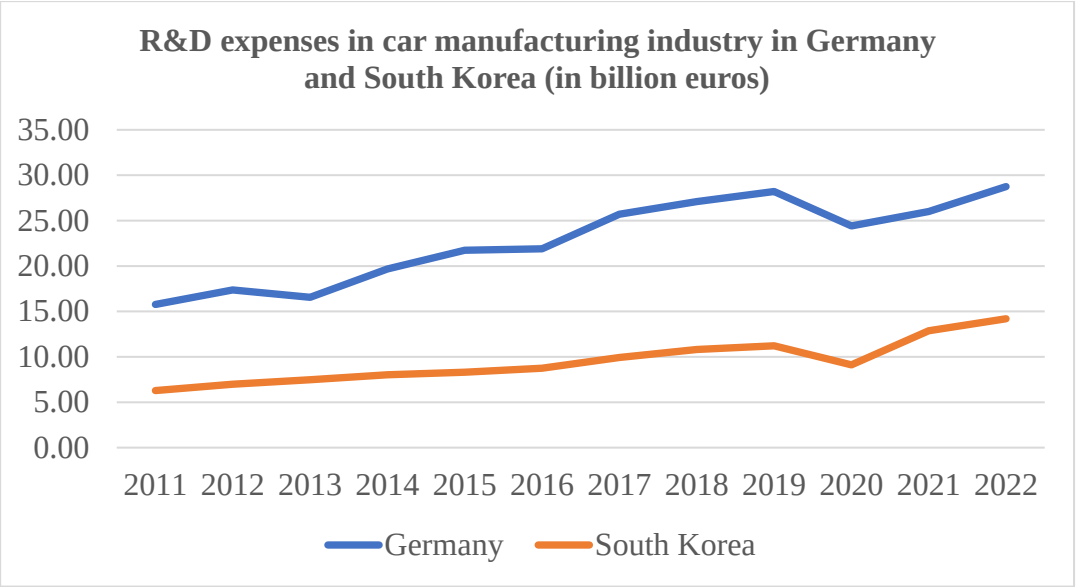



**Fig. 4** R&D expenses in car manufacturing industry in Germany and South Korea (in billion euros) [8,9]

Source: Statista, 2024

### 4.2. Demand Conditions:

In recent years, countries have launched policy documents related to carbon neutrality. According to Figure 5 and Figure 6, as early as 2015, South Korea was among the first to be aware of climate change and its impacts, with more than 75 percent of people aware of climate change. The number of people who are aware of the serious threat posed by climate change is between 80% and 90%, far exceeding the 50% to 69% in Germany. The Korean public is aware of the seriousness of the problem, which naturally creates a demand to buy new energy vehicles to protect the environment. Figure 7 shows a CAGR of 60.16% for Germany and 81.14% for Korea. The market share of new energy vehicles is growing exponentially, and although it started later than Germany, Korea's growth rate is faster than Germany's, indicating that new energy vehicles are highly favoured in Korea. In recent years, new energy vehicles have only become widespread around the world, and Porter argues that domestic consumer demand can force companies to innovate related products and internationalise domestic demand [10]. According to Figure 8, the export value and quantity of Korea's new energy vehicles have reached record highs, and internationalisation has been very effective.

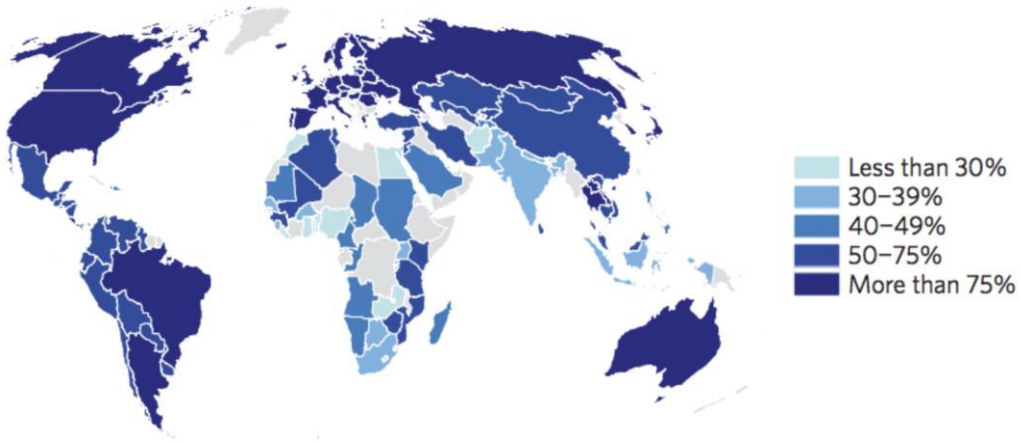



**Fig. 5** Aware of climate change [11]

Source: Carbonbrief, 2015

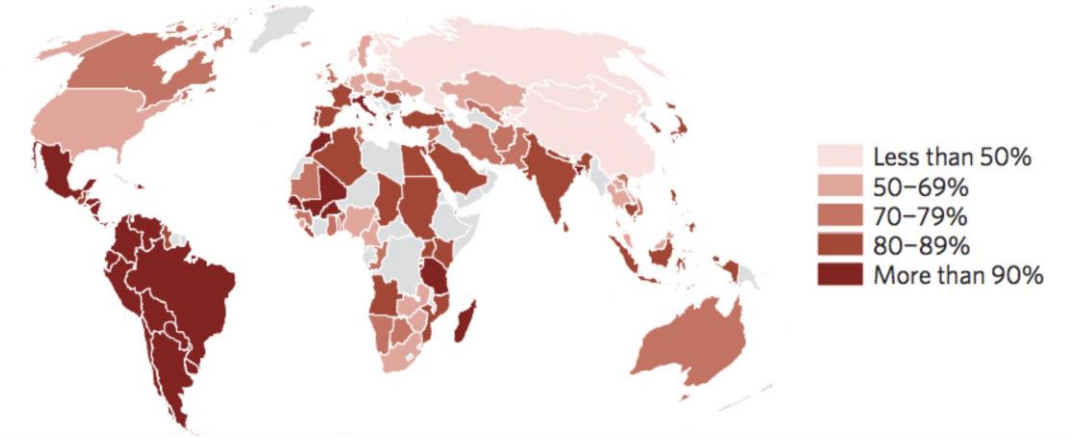



**Fig. 6** Of the 'Aware': climate change is a serious threat [11]

Source: Carbonbrief, 2015

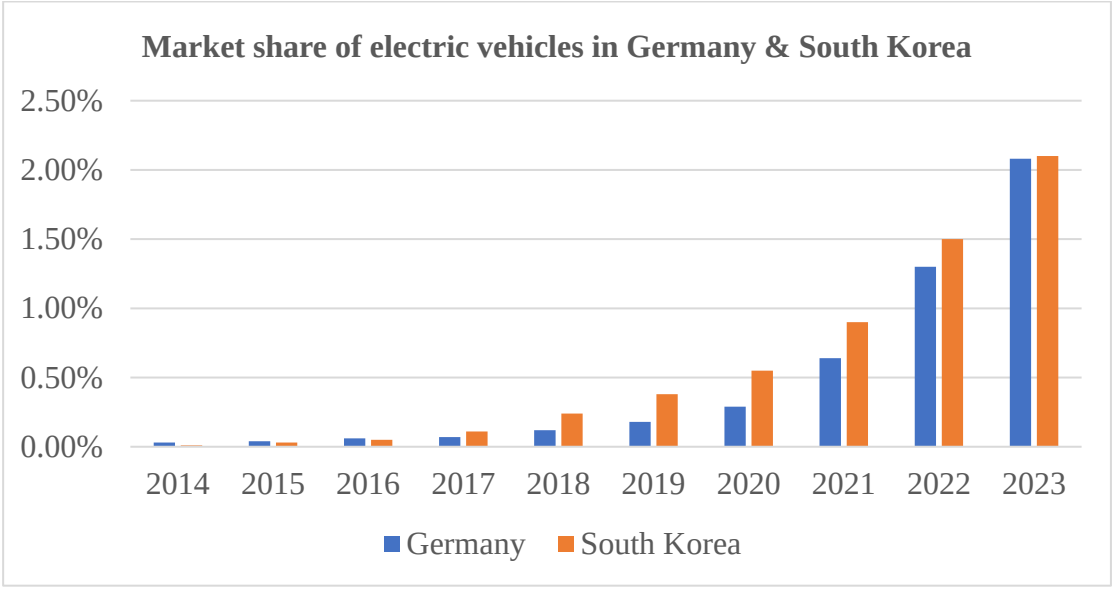
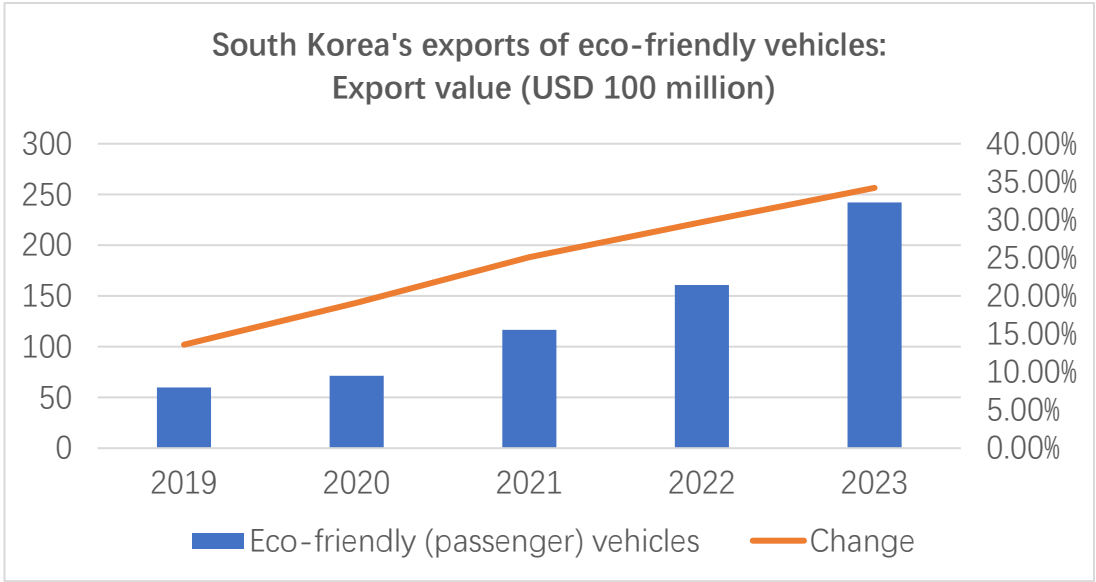



**Fig. 7** Market share of electric vehicles in Germany & South Korea [12,13]

Source: Statista, 2024



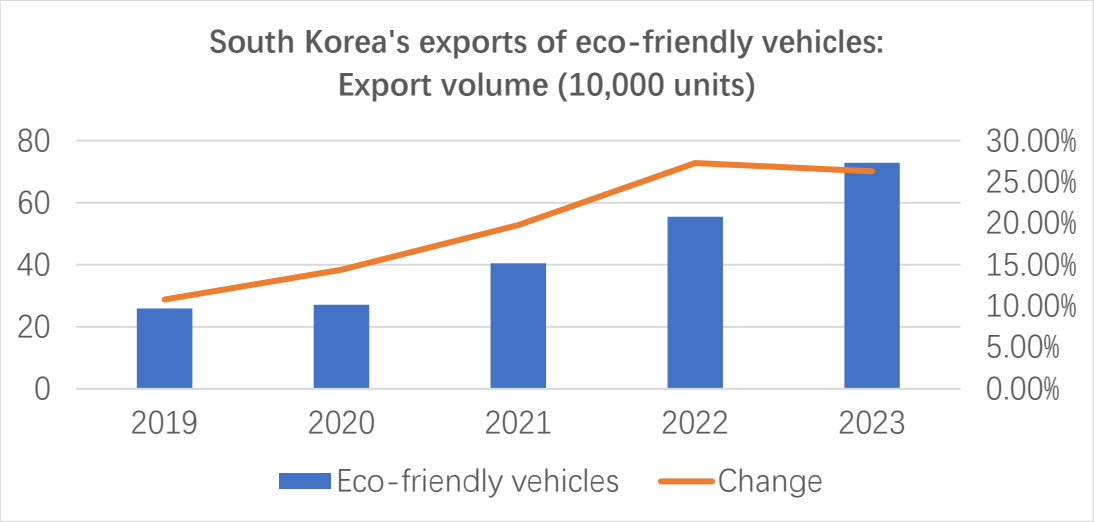



**Fig. 8** South Korea's exports of eco-friendly vehicles: Export value and Export volume [14]

Source: Invest Korea, 2024

### 4.3. Related and Supporting Industries:

Korea relies on imports for most of its auto parts, which are costly and much weaker than Germany, and faces various problems of supply at any time. In the face of such a disadvantage, the Korean government and automobile companies faced the problem head on and overcame the difficulties to convert the disadvantage into an advantage. They took the lead in coordinating the rest of the industry all need to participate in a department for consultation on this matter. This not only saves the cost of researchers but also makes the auto manufacturing parts from import to achieve self-sufficiency. Germany's auto parts mainly rely on Europe's strong parts supply chain, but compared to South Korea, the lack of a self-sufficient, stable output of the original parts, once faced with the new crown epidemic, the financial crisis, and other uncontrollable impact, will be on the German automotive manufacturing industry will have huge problems. However, it is not that Germany this approach is not right, Europe's strong parts supply chain, due to their mass production, results in economies of scale, which in turn will significantly reduce costs.

In Porter's diamond model, Porter also emphasises the importance of complementary goods. Cars and infrastructure roads are complementary goods; the better the road network, the stronger the desire to buy a car. Germany has a road network length of 645,060km and South Korea has a road network length of 112,700km [15]. Germany has a land area of 357,590 km2 and South Korea has a land area of 100,300 km2. According to the formula of road density,

$$Road\ Density = \frac{Road\ Network\ Length}{Area\ of\ Region} \tag{1}$$

it can be calculated that the road density in Germany is 1.803 km-3 and in South Korea 1.123 km-3, so the roads in Germany reach more places and more people will buy cars due to the convenience of travelling. Better road infrastructure in Germany will further stimulate demand [16].

### 4.4. Firm Strategy, Structure and Rivalry:

The strategic structure of German and Korean automotive firms is slightly different. The management of innovation in German automotive firms consists of five aspects, philosophical innovation strategy, institutional innovation, development of useful rules to innovate to adopt various innovation strategies in the market, changing the organisational structure, and placing a high emphasis on the

elements of cultural and environmental innovation [17]. Germany is more focused on innovation and quality while Korea focuses on quality and design.

For employees, Germany has a good salary and benefits package in the automotive industry, and a robust career development system and leave system. It can generate positive employer branding, which can further attract talent and enhance employee loyalty and stability. Whereas South Korea has been experiencing labour relations confrontation since the Asian financial crisis, they have placed more emphasis on utilising fragmentation and automation of work [17]. The fragmentation of work undoubtedly increases the work intensity of employees, and the process of automation leads to unemployment for some people. So, it will create positive employer branding in the minds of the Korean masses, leading to a lower willingness to work in Korean automotive companies, and consequently less influx of talent.

### 4.5. Government:

The German government has effectively strengthened its subsidy policy for new energy vehicles by providing a subsidy of 6,000 euros for new energy vehicles up to 40,000 euros. At the same time, it has increased the tax on vehicles with higher CO2 emissions [18]. The Korean government fully subsidises new energy vehicles priced below 39,900 euros. Although there are some differences in the number of subsidies for new energy vehicles, they are generally supportive of new energy vehicles. Germany's capital market is more mature and stable, and the government's capital market regulation of the automotive industry is relatively loose, encouraging enterprises to raise funds and invest on their own. The Korean government is more active and proactive in the capital market regulation of the automotive industry, and the government regulates and controls investment in the automotive industry to a certain extent to ensure the healthy and stable development of the industry. Secondly, the German government provides great help to the automotive industry in terms of financial support, while the Korean government focuses more on providing help for the future development of enterprises. One is visible financial help, and the other is soft power help.

### 4.6. Chance:

The current international situation is turbulent, and all countries are exposed to the risk of war. Germany relies heavily on imports for its raw automotive parts, while South Korea produces its raw parts. In the face of such an extreme situation as war, Germany's automobile manufacturing industry will be greatly affected, while South Korea can take this opportunity to export automobiles on a large scale, increase brand awareness, attract more global customers, and at the same time, understand the needs of customer groups in different markets.

Germany is currently a global leader in autonomous driving, with German automotive giant Mercedes-Benz already commercially deploying self-driving cars globally [19]. If successful, this could be a huge business opportunity to quickly capture the market for autonomous driving and in turn, own a larger share of the global market.

## 5. Observations of Competitiveness

South Korea's transport infrastructure is relatively weak compared to Germany, which can increase investment in infrastructure road construction, reach more users, and then stimulate more people to buy cars. Germany's automotive research investment leads to its extremely high quality and intelligence, South Korea should strengthen the investment in automotive R&D to use the talent policy to attract more talent.

In the future, the new energy vehicle market has a very good prospect and may become the dominant position in the automotive market [20]. Germany can strengthen the education related to environmental awareness and public advertisement. Also, the German government can strengthen the construction of charging stations to further stimulate the consumption demand of new energy vehicles and seize the opportunity of new energy vehicles.

Autonomous driving is a good market opportunity, there is a large market waiting to be developed. However, whether people can accept autonomous driving and whether they will be rejected by autonomous driving [21]. This is a question that Germany should reflect on. If autonomous driving is not recognised in the future, then the huge investments made upfront will be wasted. To face this problem, the German automotive industry can first survey countries with high global demand for cars to observe the acceptance of autonomous driving. Based on the results of the market survey and customer demand, then go to a targeted region or country to increase investment.

## 6. Conclusions:

In conclusion, the comparative analysis of the Porter's Diamond Model shows that Germany has the advantages of innovation and quality, both of which can ensure that Germany can maintain its advantage in the global competitive market and be favoured by consumers. South Korea does well in flexible management policies and new energy market insights, which allow South Korea to react quickly to the unpredictable market, identify opportunities and minimise losses.

The German automotive industry needs to improve domestic demand for new energy vehicles. Korea's automotive industry needs to improve research investment, quality, and talent development. At present, the global economic situation is not optimistic, Germany and South Korea are in the future because of the unstable economic situation which may cause losses. In the face of these problems, it is necessary to analyse them considering specific national conditions and specific markets.

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