
# Technological rise of China

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## Abstract

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Nowadays the most important topic and most discussed is about the technology, and the possibilities in the future. Decades ago, the country was not even mentioned in the technology field. Years passed and now China is one of the top world producers in the technology field. There are many reasons behind the successful growth, but no other country had managed to do it so rapidly and successfully. The research was done in 2024.

This research based, mix of both quantitative and qualitative analysis thesis analysed the technological rise of China. These methods were found out and summed up in the literature review. The aim was to find reasons behind technological growth of China, what led to it, and the possible future outcomes. To understand more in-depth this research, the author firstly decided to do the desktop research, then thematic and content analysis of academic research, to write and support the theoretical framework.

These results of the research showed the answers of three investigative questions and topics, firstly relating the key factors of the 21st century of China, investment strategies behind China technological growth, and the last one, the future prospects of China on the global level.

As a result of this research-based thesis, the main question and investigative question we're answered. China from the early basis, starting with open-door policy, attracted foreign investors. By doing so, many western companies started to invest money here, build business. Then the investment started to rise, business part of manufacturing also and China became more important part of world of manufacturing. Also, sending students to study across the world, to bring new ideas, learn from new people, then coming back made a huge difference. Strategic thinking of the government, to learn from the technologies and start to try implement on their own led to the great development of the country. As their economical gap narrowed, China started to invest a lot of money in the research and development, building strong relationship with countries across the world and doing research projects leading to a win-win situation. Project planning introducing plans like "Made in China 2025" and being the global leader of AI by 2030, led the vision to work harder for the country. Technological giant appearance on the global map, and the growth rapidness, means only good and fast results for the country, to become a global leader and economic powerhouse.

**Key words**
Artificial Intelligence, Research Development (R&D), Gross Domestic Product (GDP), Central role of the government, open-door policy, sanction, "Made in China 2025", Industry 4.0

## Table of contents

# 1 Introduction

This is research type-based bachelor's thesis for the Degree Programme in Business information technology in the major of the ICT and business in the Haaga-Helia University of Applied Sciences. The thesis aims to investigate the reasons the technological rise of China, what are the reasons behind the development and the future prospects. This chapter includes topic, background, delimitations of the research, benefits, key concepts. In this chapter, the short historical information is provided for the reader to get a better understanding of what the author is talking about. In the next chapter, the Theoretical framework will be described in detail, with the sub-chapters, structure of the theoretical framework to support and describe the information needed for the further analysis of the thesis. In the 3rd chapter, research methodology is presented and how the author did the analysis of the research-based thesis, how the data was collected, what we're the steps for the data study and findings. 4th research findings chapter will include sub-chapters which each individual investigative question and if the research questions where answered. And the last 5th chapter will be the finalization of the research-based thesis. The author will describe the findings of the thesis, recommendations, limitations, reliability and usage of the research for the future, suggestions for further academic research to other writers and review of his personal perspective, what the author learned from this thesis writing.

## 1.1 Background

In recent years, the country name of China is heard more and more everywhere across the world. Especially starting with the field of Technology. News about new technologies, new production lines, future, robots, conferences of the automotive industry, research, academic awards are now all coming from China. Most advanced production lines are firstly built in China and produced by them. People are travelling and are amazed how far the country has advanced from basic daily life infrastructure, trains, roadways, to going to shops with no cashiers. Big buildings, lights attract nowadays tourists and high-skilled people to work and travel to China. It is amazing how country managed to change the image from 20th century and become even a tourist attraction to see how Chinese people live their daily lives. Of such drastic evolutions, there is always plenty of steps and strategies, why these things happened. Beginning with the Chinese character traits, there are many different opinions. But, from author perspective they are known as very polite, honest, loyal people. They are disciplined, and this character trait is very important for reaching the goals and strategies, not only in school, but in life as well (Lihua 2013). Everything starts from people and ends with people. Humanity creates everything and can destroy looking back at the history. On the other hand, after the dark times, comes bright. Around 1960s China suffered from economic crisis. Government needed to think of something new, so that is why changes started around the 1970s,

when the country opened to foreign trade and global economy, business with other continents, countries. Since then, China step by step with many more different strategies, has performed wonderful transformation of the Technologies and became one of the global leaders in innovation, entrepreneurship and many more fields in the other sectors. This transformation has not only changed the country in the economic and social way but has also showed the world how the transformation can be made. The rapid growth across all the sectors led the country to become second world largest economy. That is why the author pursued this research-based thesis, for the understandability, his own interests of technology, history, the country itself and maybe future benefits.

The purpose of this research is to increase knowledge, understandability why the China has rapidly grown into one of the global leaders in technological innovation, what are the reasons behind successful changes it, how it will advance in the future. This information is useful for businesses, who wants to invest in China, developing countries, who wants to follow the China's successful growth and strategy into their own countries' strategies.

### 1.2 Research questions

IQ 1. Key factors driving the technological rise of China in the 21st century?

IQ 2. China's investment in Technology, how it impacted the growth of development?

IQ 3. Future prospects for China Technological development on the global level?

Table 1. Overlay Matrix

| Investigative Questions (IQ) | Theoretical Framework(chapter) | Research Methods | Results(chapter) |
|---|---|---|---|
| IQ1 | 2.1, 2.2, 2.3, 2.4 | Qualitative, Quantitative analysis. | 4.1 Key factors that drove China's technological rise in the 21st century. |
| IQ2 | 2.1, 2.2, 2.3 | Qualitative, Quantitative analysis. | 4.2 China investment in Technology, how it impacted the growth |
| IQ3 | 2.5, 2.6 | Qualitative analysis. | 4.3 Future Prospects for China Technological development on the global level |

### 1.3 Delimitation

This research has been limited to only Technological development of China, which includes only the sectors like, Artificial Intelligence, R&D, Car industry, manufacturing. GDP and other statistics will be included in the thesis. China's economy is enormous, and numbers will be also enormous, but the comparison countries will be selected only according to the size of the GDP. This topic is huge, but the focus will be only on the research questions and not outside the scope of the questions. Important to notice, that the thesis topic should always be narrowed. Wide topics are difficult to write, and big amounts of literature can affect the final result, and not properly answer the research question (Murto & Stryjan 2021, 3).

### 1.4 Benefits

This thesis gives insights and knowledge about the factors, drivers why the China advanced in the technological development rapidly, what are the reasons behind the growth, and Future Prospects of the country. Therefore, this study is beneficial for countries, businesses, people who seeks knowledge and investment companies. Starting with developing countries, they can follow the

pattern, principles of the development that China followed, or gain some new information, to adjust their development way. Businesses can evaluate if they want to invest in China's market, building factories, R&D etc. If the drivers, factors, and reasons are favourable to the company. People, who just want to understand the reasons why the country rapidly grown to the technological global leader. Investment companies, who seeks understandability and seeks for the future knowledge, if the China's is the way to go to make big investments.

### 1.5 Key words

Key words described in the research listed beneath. Key concepts is needed to provide the reader with the better context and understandability, what will be discussed in the thesis.

**Artificial Intelligence** (AI) means simulation, trying to recreate processes by computers, machine-learning models. AI learns from the information they are given to. It can be data, question. Artificial Intelligence is used across pretty much all sectors in life, for example healthcare, finance, security and many more, where the systems require human intelligence (Britannica 2024).

**Research and Development (R&D)** Steps that company takes, to create something new, for example, product, software. To generate ideas, R&D is mostly the first step in the development. Companies invest a lot of money to generate new outcomes, to add revenue to the company (Investopedia, 2024).

**Gross Domestic Product (GDP)** GDP is total value of market in currency. This includes finished products, software and other stuff that's been created inside the country. Most of the time, the GDP is calculated on a yearly basis. Gross domestic product is used a one of the economic scores to calculate the success of the economy (Investopedia, 2024).

**Central role of the government** Includes all the country departments and agencies that are responsible for economic growth and problems.

**Open-door policy,** international agreement with the U.S. regarding global trade and all other aspects of economics (US Department of State).

**Sanction** penalty for the country by stopping global trade, or other aspects, for example travelling. Sanctions is applied when country do not follow law regulations. For example, sanctions on Russia, stopping trades with Russia due to war nowadays, transaction, goods, exports, imports that had been stopped. This is an example of sanctions (Britannica Dictionary).

**"Made in China 2025"** Country strategy to become a leader in manufacturing in the coming years. This includes all high technologies and sectors that strongly generates revenue. For example,

aviation, robotics, medical or information technology and many more sectors (Wübbeke, Meissner, Zenglein, Ives, Conrad, 2016).

**Industry 4.0** or in other words Fourth industrial revolution, changing and gaining control over all aspects in the humanity field and in the companies. The sectors for Industry 4.0 include Internet of Things, 5G Internet or even 6G, Cloud manufacturing (Vaidya, Ambad, Bhosle, 2018).

## 2 Theoretical Framework

Theoretical framework is like a ground or starting point for the academic writing, summarization of concepts, theories that will help to support the research thesis. Additionally, it is demonstration for the readers of the thesis to familiarize with the topics that the author will describe, to have better understanding in other chapters as well (Vinz, 2022). Revolution always changed people lives massively in good but also sometimes in a bad way. Starting with the first industrial revolution, it was the most changing one of all the revolutions, because of the effect on people's lives. This revolution gave the humanity new tools and machines (Wilkinson, 2023). However, in especially this decade, humanity forgot how much important these steps we're when the Fourth Industrial Revolution or in other words Industry 4.0 started. This industry will change people's lives across all the aspects of life or in other words, everything from the ground.

No difference is the research that the author is focused on – technological rise of China. This country is experiencing the same revolution as other countries, but with rapid speed of emerging technologies, that no other country can catch or compete with quickness of the changes. China is almost at the same level with United States of America. Country is around 70-80 percent at the same level in high level technology production as the United States. Also, if this speed continues to be successful, it is possible that U.S. will be left behind around the 4th decade of 2000 (Clay, Atkinson, 2023).

This thesis intends to analyse the theoretical framework which is illustrated in the Figure 4 below. The main concept and idea of this research is in the middle – technological rise of China. Other concepts that are connected in this bubble relates to each other through the main bubble. Every bubble is like an event and one bubble cannot live without the other bubble. That is how we get the result – technological rise of China.

The theoretical framework chapter is needed to support the results section provided later in the thesis. It is like a ground base which everything starts to build from. From good ground base the research study becomes easier and findings. Developing conclusions becomes easier (Sreekumar 2023).

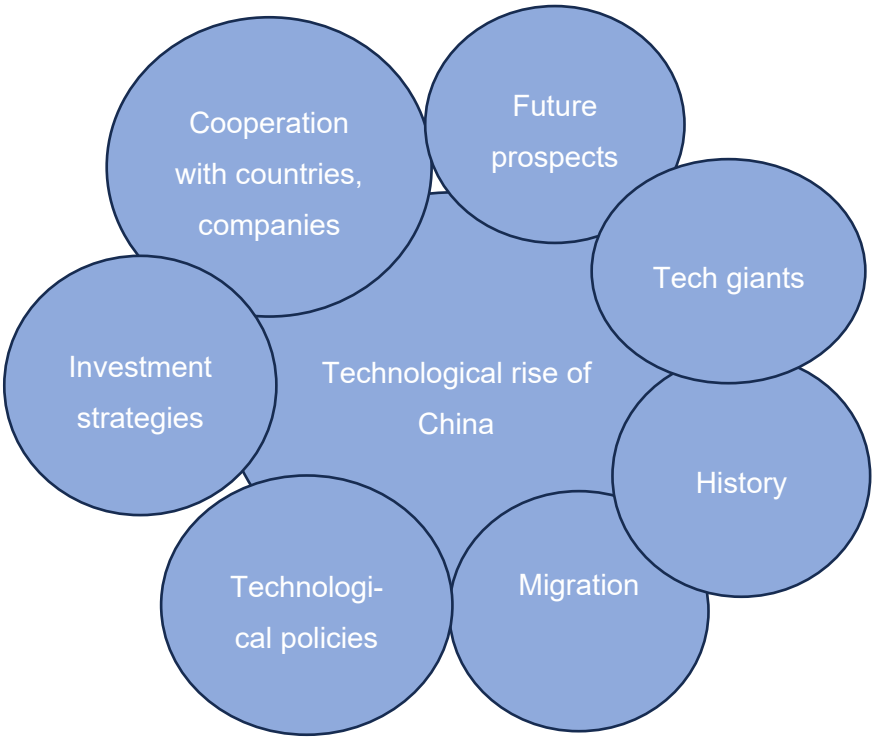


Figure 1. Structure of the theoretical framework

### 2.1 History of China development and Tech policies

Starting with history, looking back at the 20th century, the country was poor, lacking good management skills due to government and friendship with the Soviet Union. The China suffered from the economic crisis and after that, the leaders decided that is time to change something and get back on their feet. With the start of the friendly open-door policy, which we're in 1960s, China began to develop economically especially in the Technological sector. Country started to build a strategy to acquiring foreign technology as the most important strategy for technological development. Around late 1980s, China started actions to do something good for their country, for example, reforms across sectors, which are the most important to the research - science and technology. The strategy included the obtainment of foreign-western technology as the main learning strategy for technological advancement. Technology acquisition from foreign investors became the new goal and focus of the country, and, with the help from these advanced companies, the structure of the country changed, and changed for the good. Most advanced countries who are mostly in the G7 or G20 started to invest here and open new manufacturing facilities, open new companies, producing lines, software systems, and many more aspects. Countries like: USA, Japan, Germany, France,

South Korea (Fu, Xiaolan, Thye, Hou 2016, 3). After Open-door policy, China is growing fast and is catching up with most advanced countries, in the technology field (Tsinghua University). From the figure below, we can see the comparison of GDP growth. China surpassed countries like Japan, South Korea, Singapore who are known for their high-tech quality products, manufacturing.

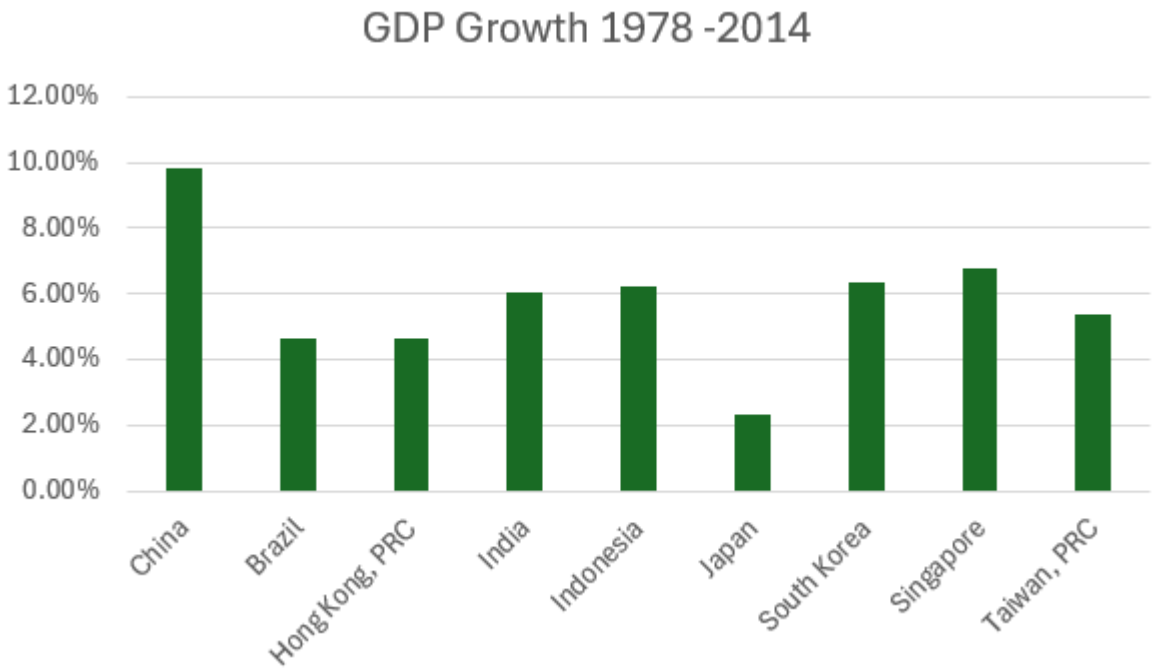


Figure 2. GDP Growth 1978-2014. (Data source: Tsinghua University).

**2.2 Migration**

People are the most essential essence and fuel for the country. It is the most important resource in the economy. By having smart, educated people good results are inevitable. Talking about technology, it is the most needed part in growth and innovation. China power rise, and one of the strategic goals, from the government was to push people to migrate and learn outside the country borders. In the late 1980s, the country published changes, but also renewed national policy to send students overseas. The goal was to fasten the development of the China and their talent growth, from the developed countries in the West and to learn from their high-level automations and management methods. Asians who studied outside the country, were clearly stated that they need to bring successful returns to the country, for example different technologies, learning, understandability of world and other essential principles, to run a company. Global opinion, to Chinese talent are ambiguous. Outside of China, academic institutions, companies gain value from the Chinese, because it is the biggest provider. As mentioned in the thesis before, western companies value Chinese for their character traits, such as discipline, honesty. Discipline is the most needed character trait, from the author's perspective and experience. To follow the strategy and goals, no matter what the

outcomes what is happening now. That is why Chinese are successful wherever and whatever they are building or creating for the future. However, the Chinese expansion in the technology and rapid growth, leaves ambiguity for national leaders, companies who acquires Chinese to work on their technology (Zwetsloot, 2020). Already around 2010s years information, around one of sixth person had doctoral degree in China (UNESCO, 2009). Let's imagine how this number has grown since a decade went by. Around half of the Silicon Valley's people, which is in USA, California and it is mostly known as a global place and leader for innovation and technology was foreign. Not a small part we're Chinese (Saxenian, 2005). Before the 21st century, most migrants stayed overseas in countries like USA, UK, but after the 21st century most of the talented people went to their mainland China, and started to work here, open new businesses, and of course they used their connections from the USA and other countries. The details can be seen in Figure 5.

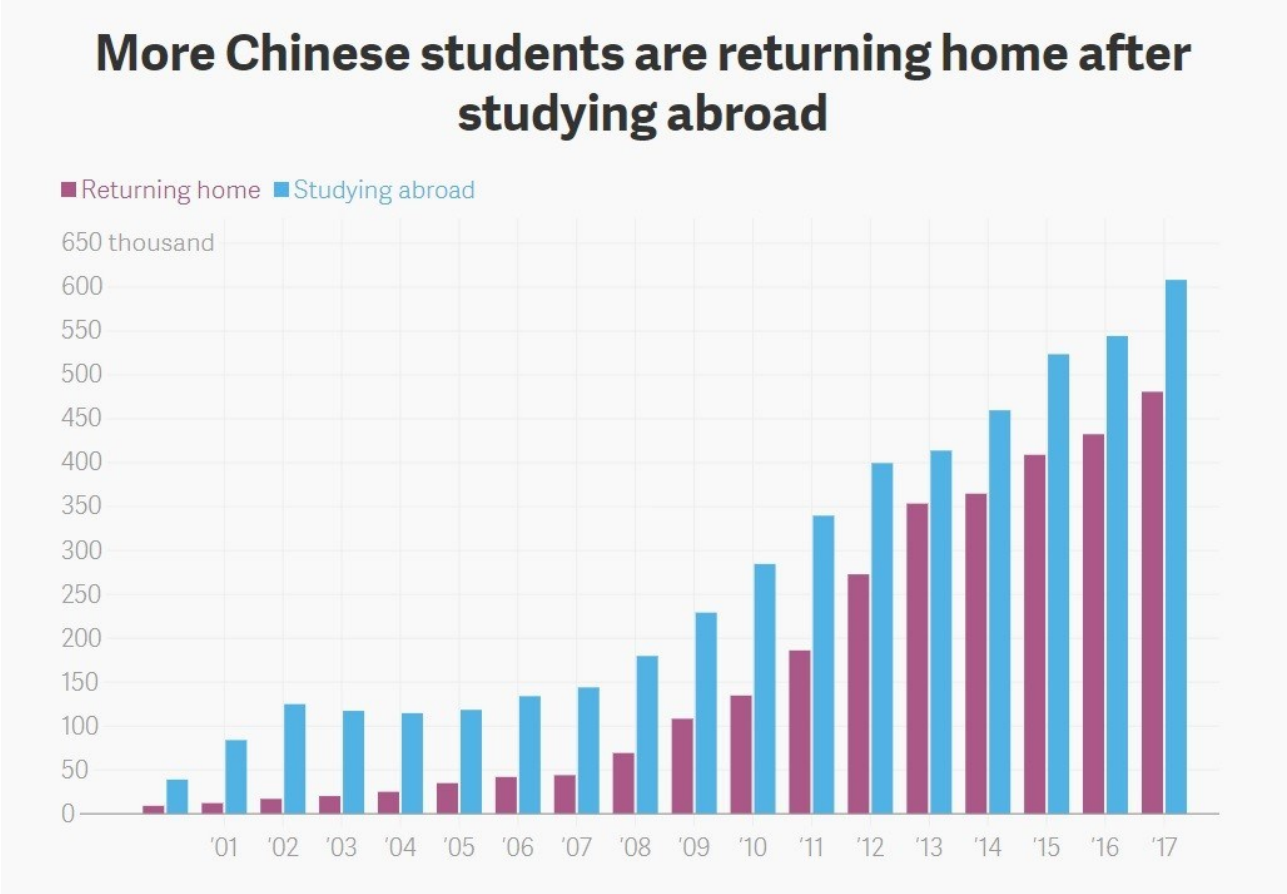


Figure 3. Chinese students' returnees (ChinaSource.org 2021)

One thing to consider, is that as well, western talent came to China to work and give the Chinese companies ideas. Chinese offered good salaries for the western talent, and they did not refuse that. Nowadays, even more people are moving to China to work, and the vision and thinking about

the country over the past decade changed a lot. From the Figure 4, we can see some of the top-level countries people in technological advancement that are studying and China. China is beginning to use purposely, it's massive resources across the globe and outranks even USA in the academic field. For example, the number of academic articles published, doctoral degrees, and many more fields that are closely related to research. (Clay, Atkinson, 2023).

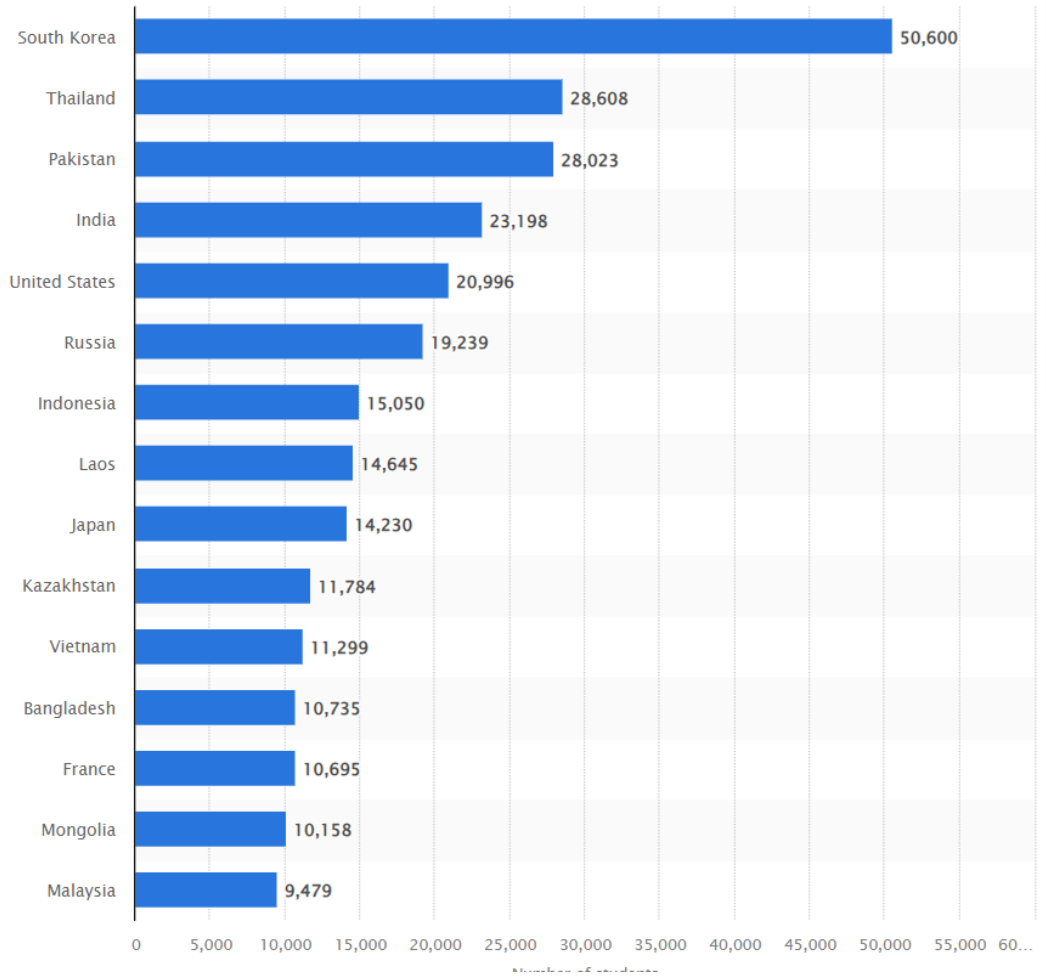


Figure 4. Origins Overseas Students Studying in China (Statista, 2018)

However, due to geopolitical problems with USA and sanctions, due to good management and strategy thinking of the country, some of the Chinese students are forced to come back home, due to economic reasons. Around 70% percent of Chinese who studied abroad went back home (Wang 2021, 12).

### 2.3 Investment strategies

Strategic thinking which leads to results from the country started around 50 years ago. Around 2010, China became one of the most advanced economies and is on successful path to challenge

the USA. They hope to become the largest economy around 2030s. With quickness and massive improvement, China strategic thinking has long and successful causes across all the world (Cha 2021). Good investment strategies, successful planning, lending, gives country the power to impact decision making across all continents. Investment money, which foreign investors invested here, got great results for the country. From the Figure we can see the projected future and rankings of the countries in 2030. With the additional value that the China is planning to add is more than 100%, around 2.5 times. No other countries can manage to add these numbers like China.

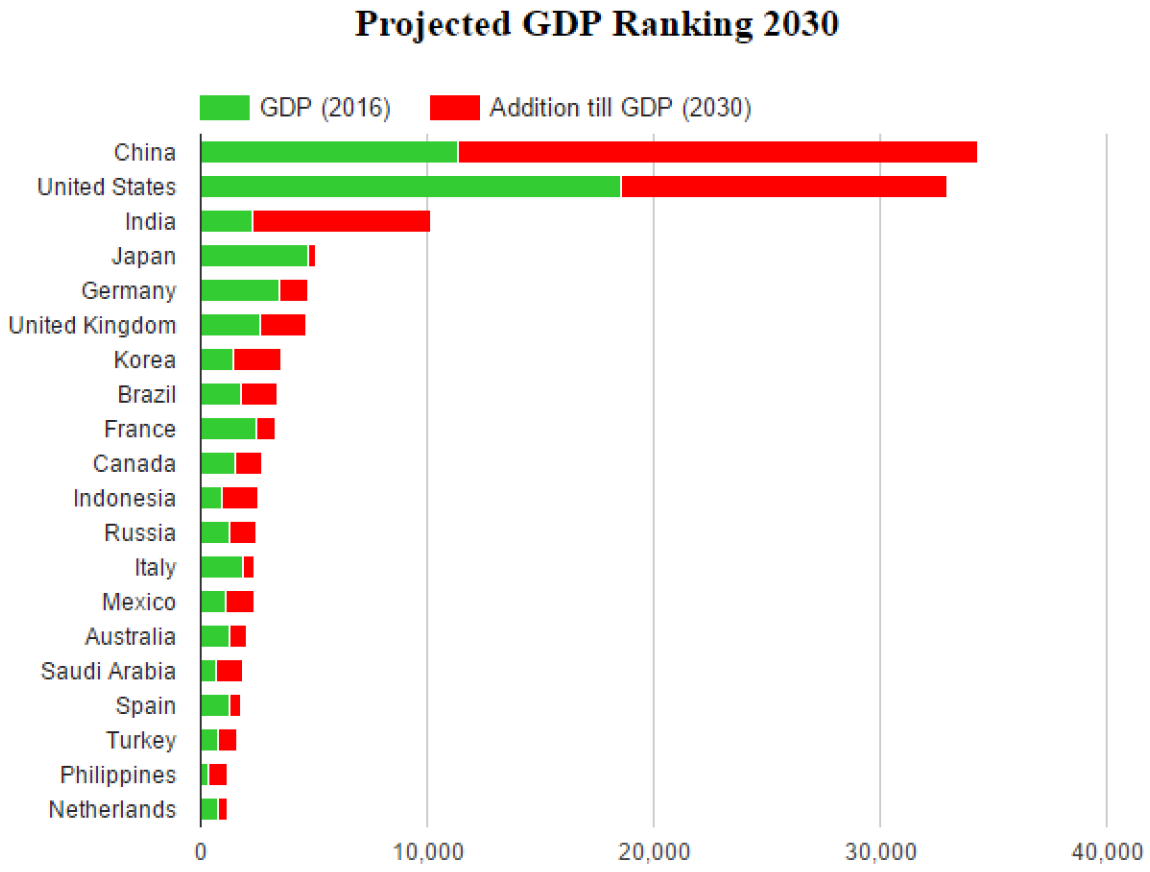


Figure 5. Projected GDP Ranking by 2030 (European Commission, 2018).

China is rapidly expanding as a leader in technology across various sectors. These probabilities in the future can bring investors eyes who seeks to invest here and prosper out of it. The spending on research is worth mentioning. As mentioned before in the thesis, research and development spending generates new products, software, and economical power. In the Figure 6 below, China's spending in 2018 was nearly close to the United States of America. Nevertheless, China's R&D spending was one of the biggest, which is more than that of South Korea, Japan, Germany. (Xu, Neeraj, Ghate 2020). Only research and development can help to create new possibilities in the economic field and gain valuable results out of it. It is not surprising to see this kind of result, when

we are talking about spending. Results of the research in development spending will be presented by the author in the following chapters of this thesis.

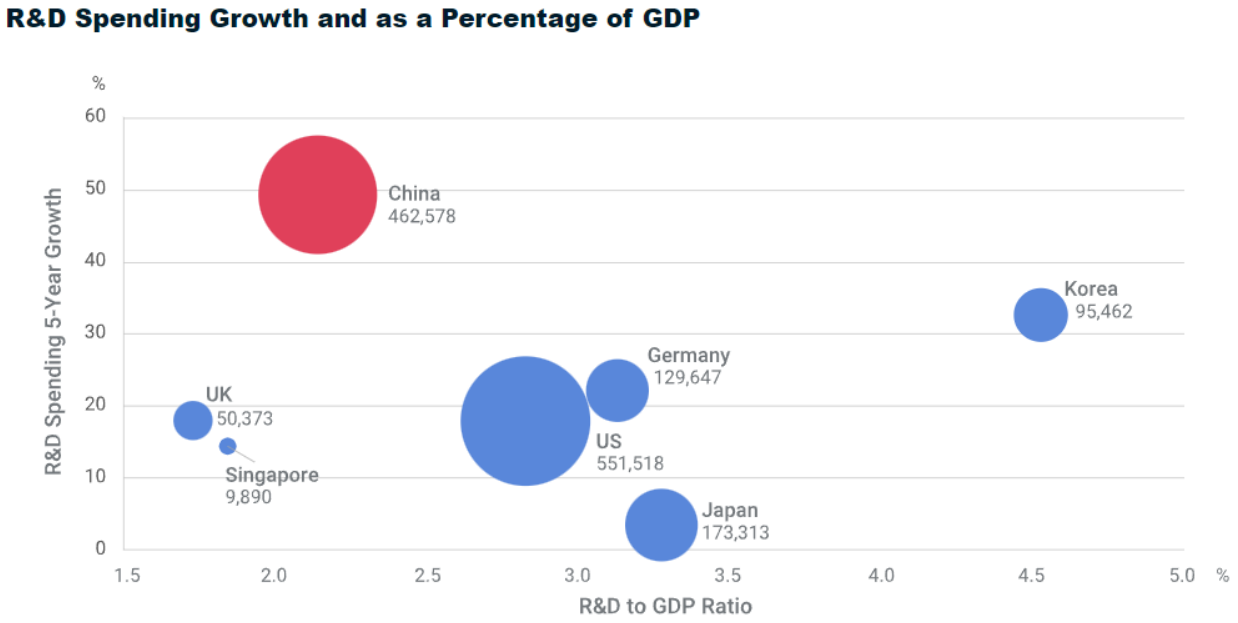


Figure 6. R&D Spending by % of GPD (MSCI 2018)

Also, to support these Figures, China developed many more strategies how to develop technological growth and become a global powerhouse. In 2015, China presented plan “Made in China 2025” which is a goal to become a top leader in advanced technological industries. From the start it was clearly stated that focus on quality is the most important factor. The goal was to invest in innovation of technology, smart manufacturing which includes focuses like machine learning, area of artificial intelligence. It was also stated that the goal was to focus, where the created technology is very hard to replicate. Common thing from China, because the country learned and learned from the western expertise and now creating amazing strategic thinking to not let other countries replicate their products (Institute for Security & Development Policy 2018). The end goal of the “Made in China 2025” is to end the reliance on international technology and be independent. In this plan 10 industries are mentioned. Include high technological systems, advanced machining technology, aviation technology, marine technology and ocean engineering, modern railway systems, eco-friendly transportation, electrical machinery and many more aspects.  In Figure 6 we can see the visualization

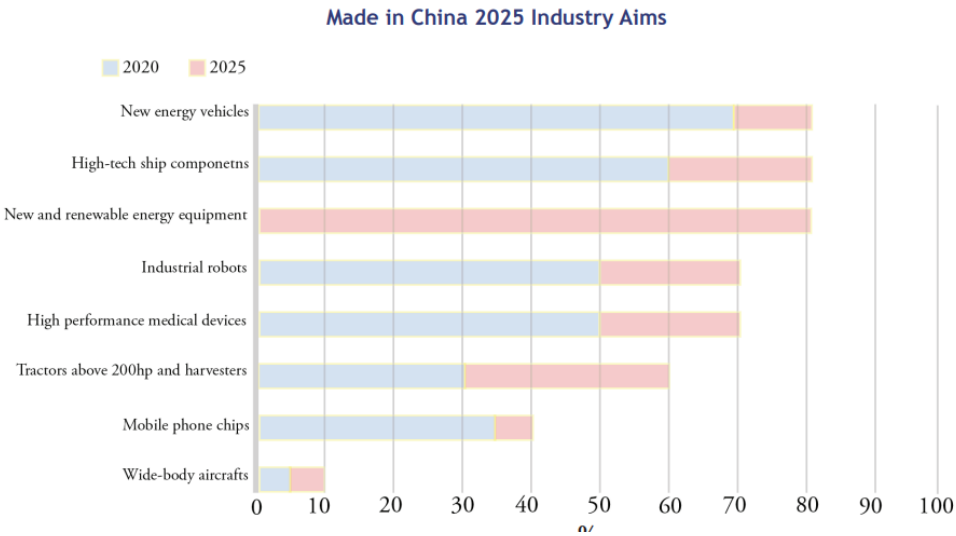


Figure 7. Made in China 2025 aims. (ISDP 2018)

Also, to add to the strategies the China's goal is to become market top contender in the artificial intelligence around 2030s. Now, China is dominating in the AI funding. There is a question, that this goal will be reached faster than expected. (P.R. China 2017). In 2017, China leads the AI funding, Figure 8.

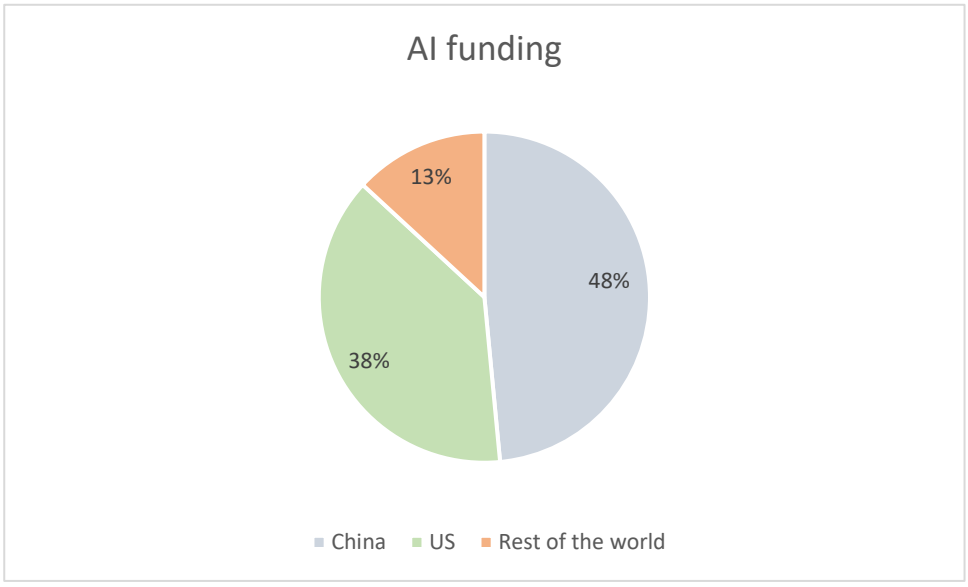


Figure 8. AI Funding. (Data source: South China Morning Post, 2018)

Country divides the AI advancement in 3 steps: First, they need to keep up with the current AI technologies, second step is to make a breakthrough by 2025, and the last step is to become global AI leader. By 2030 AI theory and the strategy plans, the technologies and applications should reach the most advanced level. Country becomes global and leader of AI (MOST 2017).

From the government council, the country even enhanced to promote, regulate, standardize internationally AI and what is the most important for the future is that China will enforce AI training across all the sectors off working life and especially in schools. Moving on to talking about the Artificial Intelligence startup companies, there are more than 3,000 of that.

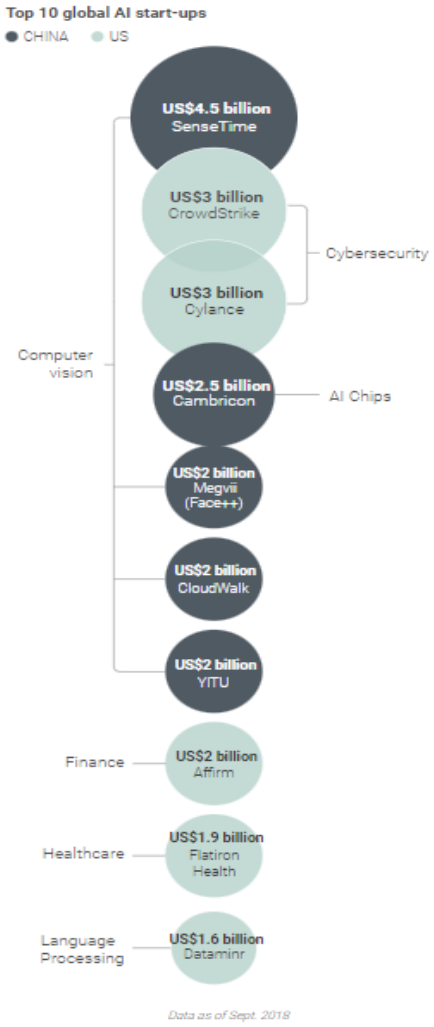


Figure 9. (South China Morning Post, 2018)

By mid-21st century, China has a goal to become a leader in space, artificial intelligence, quantum computing (Goswami, Narata 2023).

### 2.4 Cooperation with countries/companies

Starting with the open-door policy, China has opened doors to foreign investments. Over time, millions of companies joined and started to open factories, investing money in people training. Everyone though that China will be only cheap workforce, and will make only cheap products, not high-

end. But everyone though differently, except China. The country had the plans from the start to become leader in IT technologies, and other digital and advanced sectors. Their plan succeeded, they acquired a lot of foreign companies, who started to do business here. Starting with companies like Microsoft, Apple, Google and many more. Their idea was to learn how to make these technologies and then make that on their own. But no advanced countries though of that. For example, in the late 2000s, company Apple starting to make products in China. Before that, the country had limited abilities to make high end parts for things like smartphones or other highly advanced technological products. As time went by, Chinese people learned how to work, and it led to more important roles in the country for manufacturing part. After years, they started to make more parts for the iPhone, which of course lead to economic and technological changes in the country. We can take millions of examples, from car manufacturing, solar panels. The principle in every business was the same, to learn, to improve the more important part of the business, and then start to dictate the path, way for the companies. Nowadays, with electric vehicles booming across the world, China is leading the way with the building of EV vehicles, while Europe is only catching it. Country already has high end software's installed in the cars, while Europe was still developing them. Everything starts from the country friendly production system. Also, the government strategic vision and thinking. The successful results can be seen in China global technology leaders. For example, now the country is one of the solar leaders, because of the cheap making, but also of the high quality of the product. Additionally, China is making cheap, and good quality products (Abdukarov 2023). Over the past decade, and starting with open-door policy, China's biggest investor was United States and many more countries from the G7. They flourished millions of dollars into the country, that no one in history got the same amount of money. Figure 10 we can the amounts of foreign direct investment into the country.

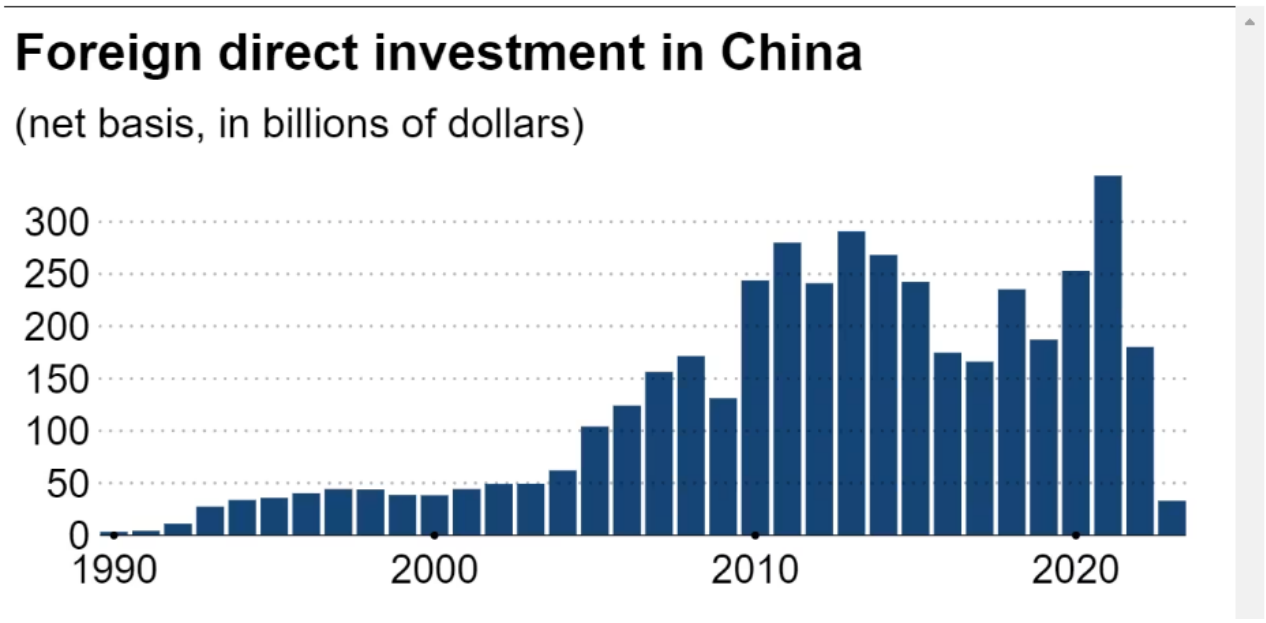

Figure 10. (China's State Administration of Foreign exchange)

From Figure 10 we can see that 2021 was the record year of investments, over 300 billion dollars went into the country by foreign investment, but after that money stopped flourishing into the country. The main reason is that US imposed sanction on China, regarding many manufacturing products. To counter that, China has started a lot of partnerships with different countries across the world. Starting with China-Germany cooperation. Various agreements starting from Information technology, vehicles, mostly known car brand Volkswagen, renewable energy, and advanced manufacturing. China is one of the biggest Germany's largest economic friends. Germany helps with negotiation in the EU, to create a better partnerships and future goals together. China and Germany are both needed for each other for their own benefits (Federal Foreign Office of Germany, 2024). Alongside that, there are also more countries in the Europe that are willing to do business with China, no matter the US sanctions that are imposed starting from 2020. Along the Germany cooperation, China is also strongly cooperating with Africa continent, and the vision of the cooperation is strongly towards advanced technology, internet connection, AI, research, and development for both parties. The goal for the country is to work together and build a future in research. Encourage both sides to work on academic research, cooperation on machine learning, data engineering. (Cyberspace of China, 2024). From this statement we can clearly understand that China is building strong relationship across the world, and imposed sanctions by US will not work against the global economic powerhouse. Not only that, but China is also building cooperation alongside other industries and always seeking for new cooperation across the world, in the information technology. Encourages teamwork of the countries to work on the same project, leading to both winning in finding new technologies. In every continent China has cooperation with countries which encourages Research and Development, Artificial Intelligence, Robotics, ICT, Quantum computing. These cooperations are working, and we will see the results in the future.

### 2.5 Future prospects

From the Theoretical framework chapters provided before, we can clearly see the possibility of the Future Prospects in China. Their goals are to become global leaders and overcome United States in the world of the technology and other sectors as well. Their cooperation and influence are getting stronger every year, with the cooperation across the continent and investments in all of the sectors. Everything started with the western world, which flourished ridiculously big amounts of money to this country, and Chinese we're smart they let them build businesses here, learned from the western technologies that we're built for a long time and started to make their own products. Now, the products, for example car manufacturers, the Chinese is dominating the Asia market with amounts that they are producing, and their car brands. With the right strategy they will become the

leaders of AI, Robotics, and Renewable energy. Cooperation with different countries across the world will fasten the Research and Development phases for the Chinese, and of course other countries, which with good results will bring faster developer of the Western countries. The West woke up too late, Chinese already is becoming global leader in most of the sectors and will not stop. Western nations started to ban Huawei products and building solutions to stop using it. Big technology companies are trying to move their manufacturing facilities out of China as well, due to dependence on the Chinese and to build in other near friendlier countries to USA. (Tanaka and Li, 2023). China companies and investors is conquering the African continent and provide these services as well (EPRS, EU-China 2030, 11). Even in the Europe, China is already investing in various projects, starting with ICT, AI, ending with infrastructure. It is very interesting to see such a big transformation over a 3-decade period, how from developing simple things, for big tech companies like Apple, Volkswagen, Tesla, the Chinese started to invest into multiple projects across the world, building the high technological solutions, cooperating with many countries in the research labs and providing the leader way in the global level.

### 2.6 Chinese Technological giants

Most of the biggest software companies like Apple, Microsoft still operate in USA, but they are looking how much the risen of Technological companies in China has risen. Chinas software and information technology services industry growth results are rising every quarter and China is producing new technologies every year, and more talented engineers are working on these projects. Soon, they will be competing with the biggest technology companies in the world with this kind of growth. This subchapter will give a strong background at what speed and sizes the Chinese companies are rising to the top. There are a lot of Chinese companies that are in the software technology, but for the research purposes the companies will be selected those that counter tackle USA companies. Starting with the biggest software company, Huawei. Created during the nineties, The company is a leading worldwide supplier. Top global provider of ICT infrastructure and smart products. The company is creating digitalization products for everyone. Around 200000 people are working every day to bring new ideas to life. Country has facilities around 170 countries (Huawei, 2020). For comparison, Figure 13 shows.

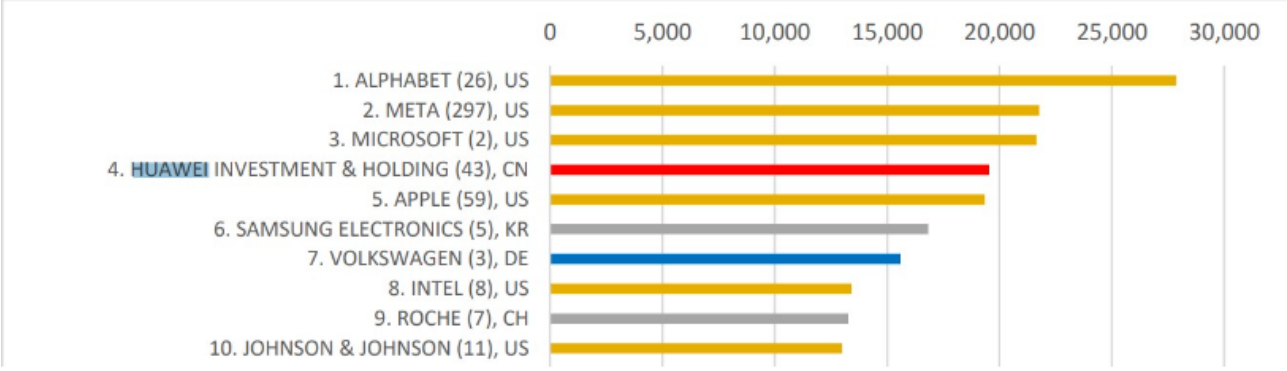


Figure 11. (Source: Huawei Central, 2022)

From Figure 11, we can clearly see that Huawei is right next to spending with the biggest US tech companies, which are working in this field longer than Huawei. In 2020, the company had revenue of $136.7 billion, an increase of about 71% over five years (Huawei, 2020). United States imposed sanctions on the Huawei and banning the company from buying essential technology products and restricting doing business with USA enterprises (Ross, 2021). The results are impressive, compared to, that US was pushing sanctions on Chinese companies and COVID-19 hits. No other countries' name appears in the charts, even with the pressure and sanctions from the other countries. Moving on to the next company, Lenovo. Lenovo is the global largest manufacturer of personal computers. The company has been expanding its products across different fields, for example, mobile phones and servers. Lenovo wants to expand into more technological fields, to conquer a bigger global market share (NikkeiAsia). This company has also only been from around late 1980s, but already is in the top 5 personal computer makers in the world, and currently leading the way, despite being sanctioned by U.S. In Figure 14, we can see that Lenovo is leading the way in

the shipments of personal computers in 2023. had around 52.9 million. (Statista, 2024)

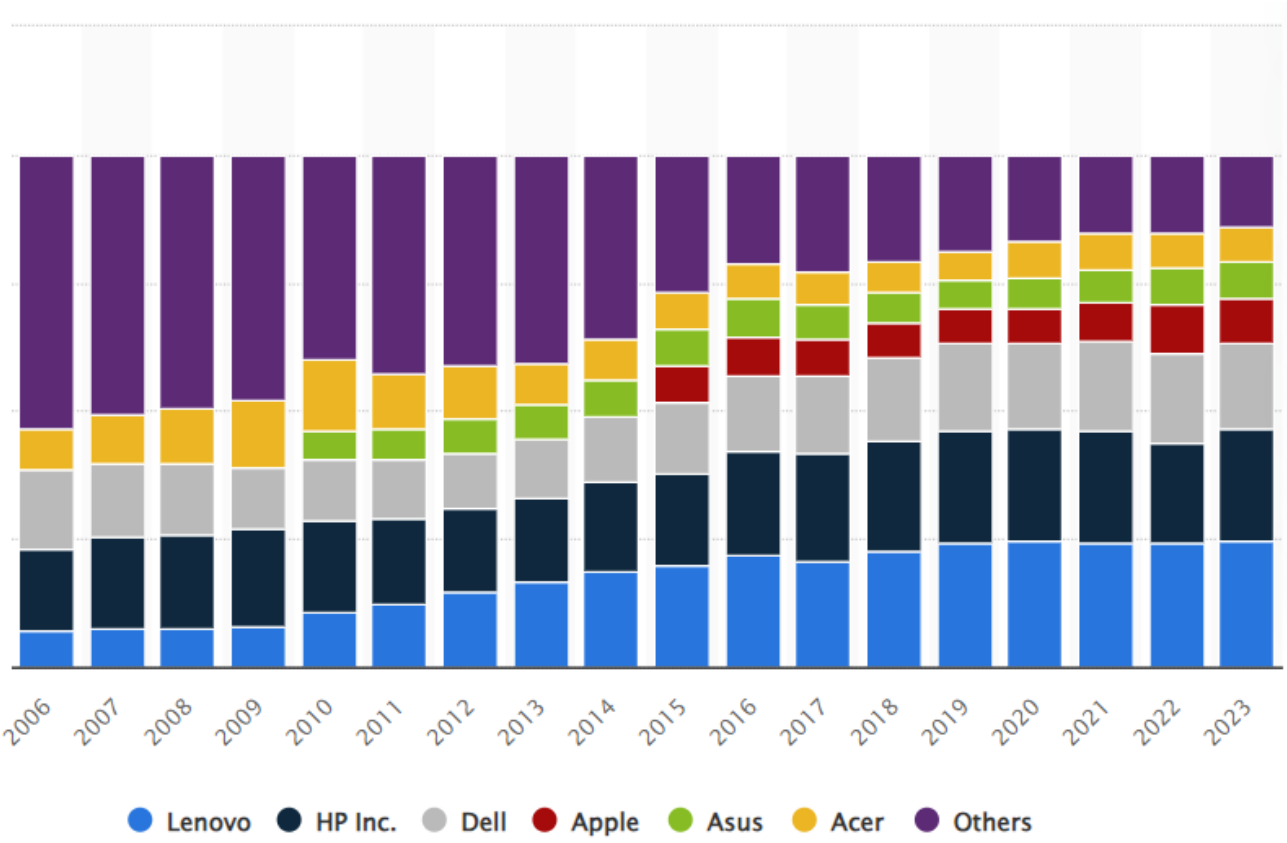


Figure 12. (Statista, 2024)

For comparison, Asus and Acer are Taiwanese companies, so we can assume as well that there is an existence relationship with Lenovo. From the chart provided, we can clearly understand that Lenovo is the leader in the exports of laptops. And the last one, that is relevant to the research is Xiaomi. Xiaomi is a home electronics and advanced manufacturing company with smartphones and smart hardware integrated by an IoT system. Strategy on advanced development and high-end product, Xiaomi goals are high-quality systems, with the cheapest products possible. (Xiaomi, 2024). The company was only founded in 2010 but is currently in the 3rd place of the most used smartphone in the world. Compared to Samsung or Apple, which exist even longer.
From the Figure 13, we can see that even Huawei is at 4th place. Even though both companies are hit by U.S. sanctions.

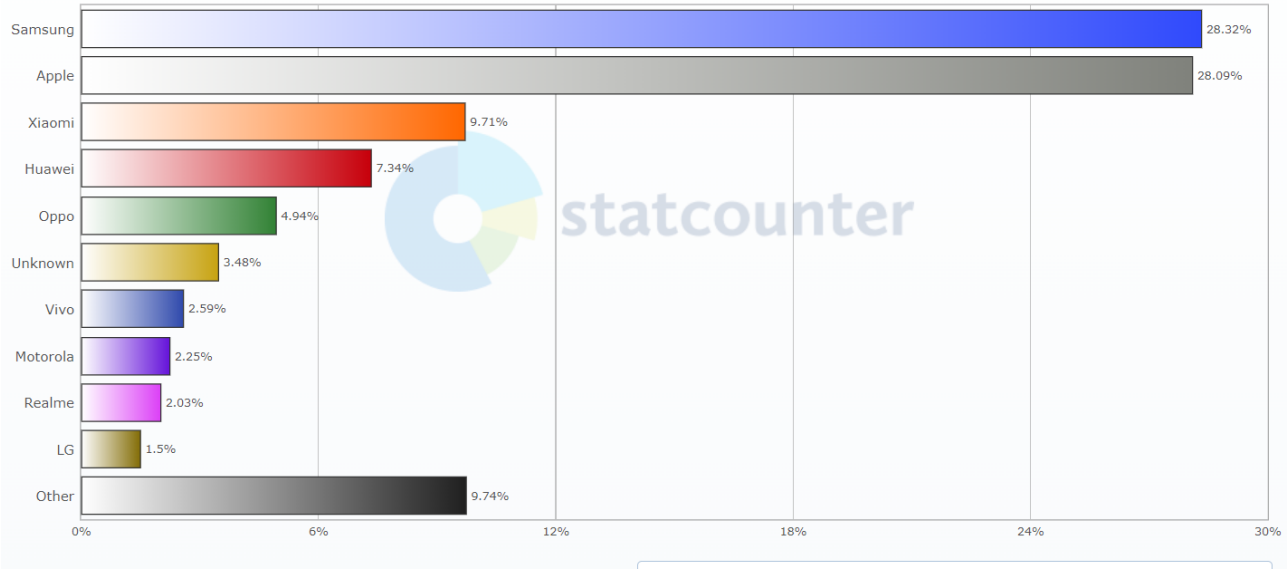


Figure 13. Mobile, Tablet & Console Vendor Market Share Worldwide 2019-2024 (Source: statcounter).

As of the newest information in 2024, Xiaomi even released the electric car named SU7. Xiaomi was shocked when they got more orders than projected and already closing the company goals for this year. The future is to become the Top 5 automakers in the world. (Cheng, 2024). From this information is possible to assume that Chinese companies is widening their products so they can have bigger global market share in the world.

# 3 Research methodology

Research methodology is needed for explanation how the research was made or in other words the methods that we're used to do the research. There are a lot of different ways to explain research and findings. It can be numbers, reasons, or combination of both methods. These research methods are quantitative, qualitative, and mixed. Quantitative method is a step-by-step process to do the numerical data analysis. The author creates a method, a system or method for his thesis to do the analysis. After following these steps, analysis of data pattern, numbers are given, depending on the research (Aggarwal 2023). Second method of the research is qualitative. Basically, the qualitative research is opposite to the quantitative. This method includes many things, starting with articles, research journals, blogs, government websites, videos etc. Also, similarly to quantitative method, the academic researcher creates a pattern, a goal, a system to find the answers in the texts (Bhandari, 2020). For example, the author creates a rule of some pattern reads 10-20 articles and focuses on the pattern described before doing the analysis. Again, as mentioned in the quantitative method, the author for this topic, used similar pattern described before. Main focus was to find answers in the investigative questions and try to answer them. The author focused on finding the patterns, similar topic in the articles and opinions. These techniques are used the most often, across different academic research. And the last one is the mixed method. Mixed method means both quantitative and qualitative research used. This method is used when one of the techniques is not enough to answer the research question. The mixed method helps to find better answers for the questions and support the academic study from different point of views (George, 2021). For the same reason, author focused on using the mixed method for the research. Qualitative method is not enough, because the opinion of writers can be different then statistical data. Quantitative method supported the author with numerical data to answer the research questions. These methods were found in the Literature review. Literature review is based on the existing texts, articles, journals. But not only based on the existing information. This information is most of the time written by the most advanced, expert people in particular field. This method helps to add on author knowledge, new information to support the thesis (McCombes, 2023). Especially, when we are talking the author research topic. More detail information will be provided in 3.2. Nevertheless, when there are nowadays such big numbers of information, most of the time authors confuse and selects not the appropriate research method (Taherdoost, 2022). The following chapter will introduce the research methods used to conduct research that will be presented later in the chapter 4. This chapter will represent different phases of the research. Starting with research design, research methods, data collection and analysis.

### 3.1 Research Design

Research design is the bridge between methodology of the research and data gathering and examination. Researchers needs to make choice what design to use, to approach the academic topic. Picks for the research should be selected depending on the problem the author wants to solve (Creswell 2009, 22).

The research design and the thesis aim to evaluate what are the reasons of technological rise of China, what are the reasons behind successful rise, and the possible future. Figure 14 illustrates the research design process. The data sources were provided in the Theoretical framework, which was clearly described in every sub-chapter. Starting with government policies, migration, future prospects, cooperation with countries/companies, investment strategies and short history. From the data source, the right articles, research journals we're filtered and selected which was the most important ones and relevant to the research topic, research investigative questions. After the investigative questions it will help to answer the Research question (Results).

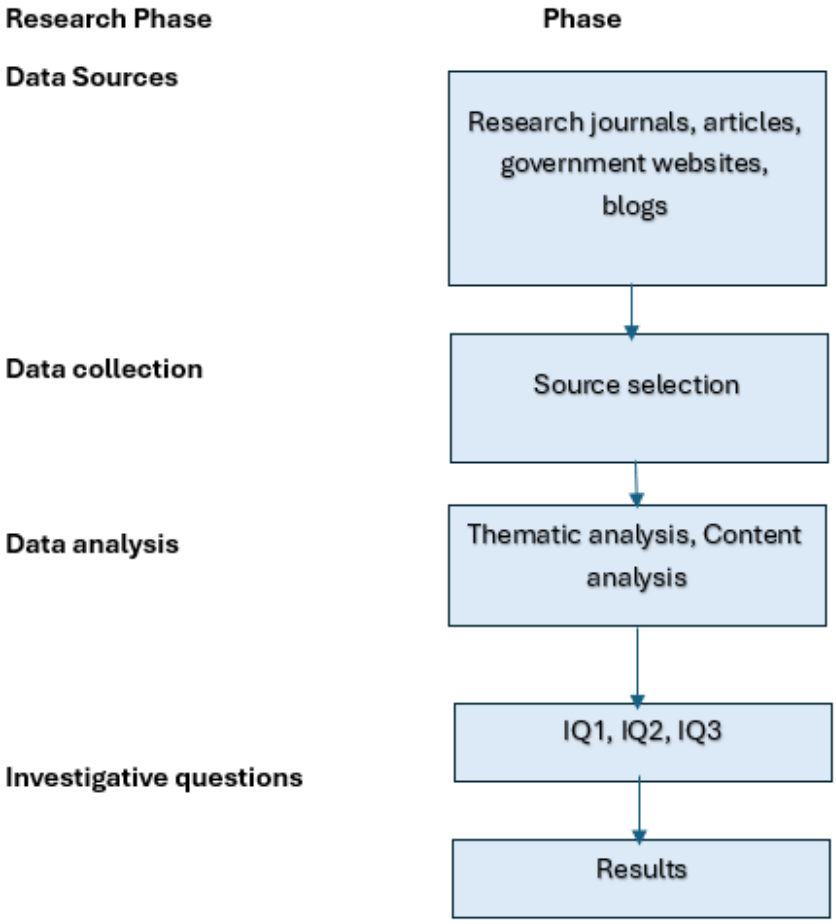


Figure 14. Research design

### 3.2 Research methods

This thesis used both quantitative and qualitative research methods. Qualitative research is done using and analysing the information that is written. This method let's dive deep into themes that sometimes are not easy comprehended (Streefkerk, 2023). Qualitative method was used, because it is the best for analysis, to understanding something, for this example it is the reasons why technological rise happened. Especially in this research-based thesis, the quantitative method was used to describe amounts of money the China invest in R&D, migration, how much international people study in China, or Chinese student went overseas, global market share across technology sectors now, and in the future, technological Chinese companies market share in the global statistics. Quantitative method mostly was used for the visualizations, to get a better understanding of position of the country, and for better context. However, the quantitative method is just a small part of the research, because mostly it was analysed web articles, research journal, blogs, of the future position of the country, which helps to analyse the current standing point. Qualitative research method was used mostly, to analyse the right information from the text, select the right articles, which helps to answer the final question of the research. Again, as mentioned in the quantitative method, the author for this topic, used similar pattern described before. Main focus was to find answers in the investigative questions and try to answer them. The author focused on finding the patterns, similar topic in the articles and opinions. Main part was Qualitative, with just small details of quantitative. From the qualitative method, it was the content analysis that was selected. All of these methods, we're sum up in the Literature review. As mentioned before, in the introduction of this chapter, this method is based on expert writing to support the current understanding of the author personal view. First, the search for the relevant literature was used. After the first stage it was found out that, there is a lot different kind of data and many different opinions regarding this topic. Author found out that primary data collection will not be enough, which will be described in 3.3 chapter. Nevertheless, author started to find some correct information to support his research-based thesis when applied key words:

China goals for the future
China compared to other countries
China investment strategies
China cooperation across continents
China top technological companies IT
AI goals for China

There are some examples of how the literature review was made by the author. After diving deep into the literature review, the author found out government websites and the real China goals for the future. The most used literature in this research-based thesis was:

Department of International Cooperation Ministry of Science and Technology (MOST), P.R.China 2017.

China Academy of Information and Communications Technology 2020. Digital Economy Development in China.

Eurasian Research Journal 2023

P.Robles 2018. China plans to be a world leader in Artificial Intelligence by 2030.

J. Wübbeke, Mirjam Meissner, Max J. Zenglein Jaqueline Ives, Björn Conrad 2016. MADE IN CHINA 2025

These literatures helped to support the research and add to the previous author knowledge. Still, the data collection which divided into primary and secondary was needed to support the research.

### 3.3 Data collection

Data collection and analysis method was selected content analysis, with small details of thematic. Content analysis is one of the research methods that is used when the analyzation is made by using the written content. Of course, it can be mixed method, for example quantitative or qualitative or both. It always depends on the author, what he wants to analyse and use. Text analysis is commonly used in academic writing and other areas of research as well. (George, 2023). Data collection started with primary and then the secondary, blogs, articles, newspaper posts, then the research journals, which we're found by the author in government websites, articles, journal. Articles we're filtered accordingly to thesis theme and the research questions that we're described before. Article selection was mostly relevant to the amount of the right information for the answering question, age of the article did not make any difference. Also, from the author's personal experience, it was already a clear view, which and what, details of the data should be selected. Thematic analysis is also one of the methods that can be used to analyse numerical data. It mostly sums up from viewing through data tables and finding similarities, depending on setup instructions. The results always depend on the researcher (Villegas). No interviews were used in this analysis, because of the rich data on the internet, which helped to make a great collection of different positions of the research. Accruing themes, across different research articles, we're found same patterns. Views from different continents, countries, like USA, EU, Germany, UK, Africa, and their official

government websites. That is way, it was the best way to get deeper understanding why technological rise of China was so rapid, and so big in size.

In the research thesis, both methods of primary and secondary qualitative research content analysis we're used. The goal of the thesis was to understand the factors or in other words, reasons why such phenomenon happened and what the future will look like. And of course, to answer three investigative questions. Key factors, investment strategies, and the prospects of the People Republic of China.

### 3.3.1 Primary data collection

Primary data gathering is mainly approached by concentrating on low-level or in other words data, that is easily found on the internet. For example, articles, blogs, emails. (Roller, Lavrakas 2015, 242). First of all, the most occurring data was selected regarding this topic, to help to answer and support the following research investigative questions. Key factors driving the technological rise of China in the 21st century, China's investment in Technology, how it impacted the growth of development, prospects for China Technological development on the global level. The primary data was from the blogs, articles, newsletters, press releases to get a strong background of what position the research is and how it will be hard to answer the research questions. When started collecting the data, the mix of quantitative data was found, so it was needed to add the quantitative method as well. Some of the Figures are from the primary data collection. Mostly, the blogs and articles had a lot of ambiguity, but the author only focused on the data and analysed information that is needed to help support the main question of the research. No tables we're created, for coded data, but the author selected the data, particularly that was needed for the research, and separated into categories for the research findings. After the first data collected, conclusions we're made of certain chapter. Also, some parts of data collection we're numerical that needed quantitative method. After the primary data was collected, then the author started to work on the deeper and more detailed data in the secondary data collection.

### 3.3.2 Secondary data collection

Secondary method concentrating on diving deep into the information that is found. Government websites, research journals, that is not so easily found at first glance. It plays a huge role for the academic writers, to confirm their topics. (Roller, Lavrakas 2015, 242). Secondary collection was used for the deeper understanding, that primary data could not offer. After the first or primary data collection, still we're left ambiguity in some of the investigative questions. The research questions were formulated: is China really will become powerhouse of the 21$^{st}$ century, and will dominate the market across technology in the future decades? When author started to do the deeper or in other

words secondary data collection, the results findings changed a lot and ambiguity disappeared. Mostly, the government websites helped the author to make conclusions and see the patterns in the categories, which we're needed. Government websites like China, European Union, United States of America, Germany, Africa countries websites we're used to gather more detailed information about the future prospects and what is situation now. Also, academic journals, government reports and statistical databases we're used to support the research topic. From the academic research, author found out that it will be needed quantitative methods as well to support the research and help to answer the questions. It helped to support theoretical framework and included parts, that would be more understandable for the reader. Mostly, the data that was collected, disappeared all the ambiguity from the research. Large amounts of data were collected, analysed and the most appropriate we're selected.

### 3.4 Data analysis

Qualitative data was collected and analysed with methods: content analysis, thematic analysis. Thematic analysis as mentioned above, is finding patterns in the data, and dividing the data into categories. Also, finding the most appropriate data to help answer the research question. However, the content analysis was used the most and it is the most beneficial for this kind of research. It helped the author to transform analysis into valuable information for the research and help to support and answer the main research questions.

### 3.5 Data findings

In the first part of the thesis, the research questions we're written in the matrix. Based on these research questions, the primary and secondary data collection we're made, and the author found out that from the primary data collection, a lot of the data gave ambiguity in the articles, blogs, and newspaper. However, after the secondary data collection, especially from the government websites it was clear that there is no ambiguity in technological growth of the country and plans are clear and supported. Mostly, the People Republic of China government websites, of Financial Affairs, and technology institutions gave author the clear view for the research and helped to support the content analysis.

| Investigative question | Data collection, analysis type | Key themes found |
|---|---|---|
| IQ.1 | Data collection: Primary, secondary.<br>Analysis: Thematic, Content. | Migration, foreign investments, strategic plans, central role of the government, open-door policy, foreign company investments, |
| IQ.2 | Data collection: Primary, secondary<br>Analysis: Thematic, Content | Migration, foreign investments, strategic plans, central role of the government, open-door policy, history |
| IQ.3 | Data collection: Secondary<br>Analysis: Content | Made in China 2025, AI leader, comparison between US, Germany and EU cooperation, Investment across the globe |

Table 2. Overlay matrix of the data findings

The investigative questions and the main research questions guided the author to find the right answers for this research. Also, investigative question 1 and 2 had some similarities regarding the found data. The last investigative question mainly was found out only from the secondary data collection, which we're from the official government sites, like foreign affairs of China, cooperation with EU and specifically Germany. Also, investments and cooperation with countries across the globe which only was found from the official websites.

# 4 Research findings

This chapter will introduce the results of the research found by the author, and how much they are relevant to research theme, and how much they are true to the investigative questions. Firstly, the investigative questions will be introduced and the results of thematic analysis. Also, the findings will be analysed. The research finding's part describes the conclusions of the research. It stands amongst the most significant parts of the research, where authors of the articles focus on finalizing the analysis they done. The chapter focuses on answering the investigative questions and by the research, the author accepts or refuses the answers. (Pedada, 2023).

## 4.1 Key factors that drove China's technological rise in the 21st century

On the results, that we're based doing the thematic analysis of the Investigative question 1, there we're all the themes in the Theoretical framework. Starting, with open-door friendly policy, that led China to attract foreign investors. After investors started to flourish a lot of money in the China, factors started to build, economic started to grow. Companies started to look for places, that could do the job for the better price and most of them went to China. By doing so, Chinese started with simple not high-level manufacturing. After the results, of good work, they gained trust of the big corporations, and more money started to come to China. More factories we're built, more parts we're constructed here. That is how China started to build their economic. And no one of the foreign investors though that China are smart, and they will start to learn from the western corporations and implement technologies on their own. With the amounts of money that we're sent to China, people started to learn higher technologies and build their own products. It was one of the key factors of growth. Also, migration. When Chinese government opened doors, a lot of Chinese people went to study abroad, getting western logic, principles of working, generating new ideas for western companies. After some time, even in Silicon Valley, there we're not a small amount of Chinese people. We can just imagine, in different parts of the world we're technology was involved how many Chinese we're working in the companies. After some time, some of these people went back home, started to build their own businesses, work in technology companies, and generate new ideas. Big tech companies like Huawei, Alibaba started to appear in the world. After some years, people started to realise that China is not undeveloped country, but developed and a lot, with high technology everywhere. These people, who came back from western world, used their connections, contacts to build businesses, and start doing it in China. Also, to add to the migration part is that, more western people came in the country to work and bring their west ideas. Chinese offered good salaries, so western people could not deny that. Also, they learned from them, how to do the business in the western way. We have now wonderful examples of companies like Huawei, Xiaomi, Lenovo which made a big impact and leap in the technological advancement of the country across all the

sectors, starting with the ICT and software. In Figure 15 we can see, how this cycle does not stop, and how the country rapidly closed the technological gap between developed countries.

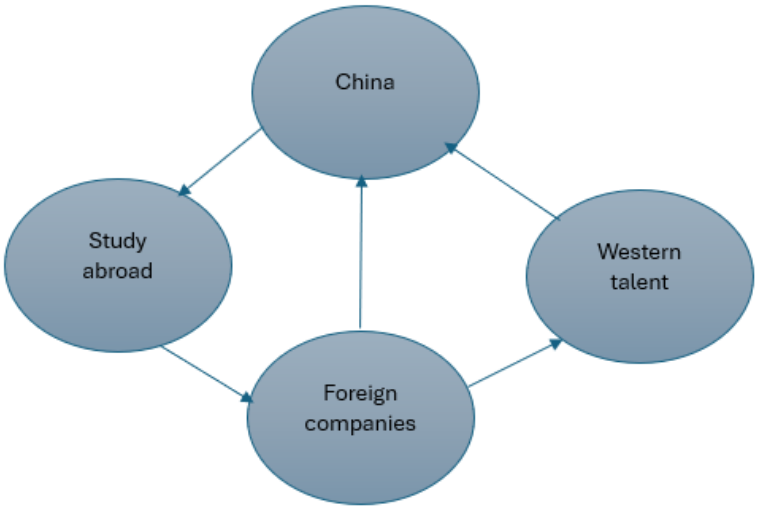


Figure 15. Chinese people migration

Moving to the next important parts of the factors why Chinese developed so fast, is that cooperation with countries/companies and investment strategies. First, they we're smart people and they understand that the only way to develop fast and quickly is to learn from someone and then adapt these logics to their own projects after some time. But firstly, they let the west and other companies to develop here, increase revenue streams from China to their global results and that is why China became so important to most of the businesses across the world. Starting with examples with companies like Volkswagen, Apple. Apple increased their manufacturing parts here in China, and after couple years, Apple dominated the countries favourite smartphone. When China GDP started to grow, they did not stop thinking only about being the simple manufacturer of the world. Government was smart and started to implement ideas from the government level. For example, "Made in China 2025" that was already mentioned in 2015. One of the ideas of this project was to be the global leaders across the most important technology parts in the world. Robotics, renewable energy, Artificial Intelligence, mobile-phone chips. The goal was to be the number one producer in the world. Another project, like to become a leader of the AI in 2030. Country do not just want to become the leader, but they also think about sustainability, standardization of Artificial Intelligence, and many more standards, that countries should follow as a group, and do not do stuff on their own. Investment strategies. Most of the information was supported from the literature review, but other articles we're needed to support and answer the research question IQ.1. After the analysis, it was found out that the investigative question was fully answered.

### 4.2 China investment in Technology, how it impacted the growth

Any discussion nowadays, without the word of China is hard to imagine. This country from the early days after letting foreign investors, known their path and where they will focus most. High level of expenditure in the Research and Development, research labs led bright future. After the investments of foreign companies, countries, and economic risen, Chinese started to invest heavily in the Technology. With the amounts of investments, no one in the world can compare, and of course with the amounts comes and results. Chinese people proven, that what they aim for they reach it at when they planned it. Having a clear goal in the way, let's clearly follow the path and forget about anything else. Country has clear vision what they want to achieve. With the following newest information, the rise and rapidness of the growth no other country can match in the world. From the results, we can clearly see that Chinese will be the new superpower of the Technology in the next decade. From Figure 16, we can clearly see the speed of the growth, no other country is doing that. The figures provided in the data chart are in billions U.S. dollars.

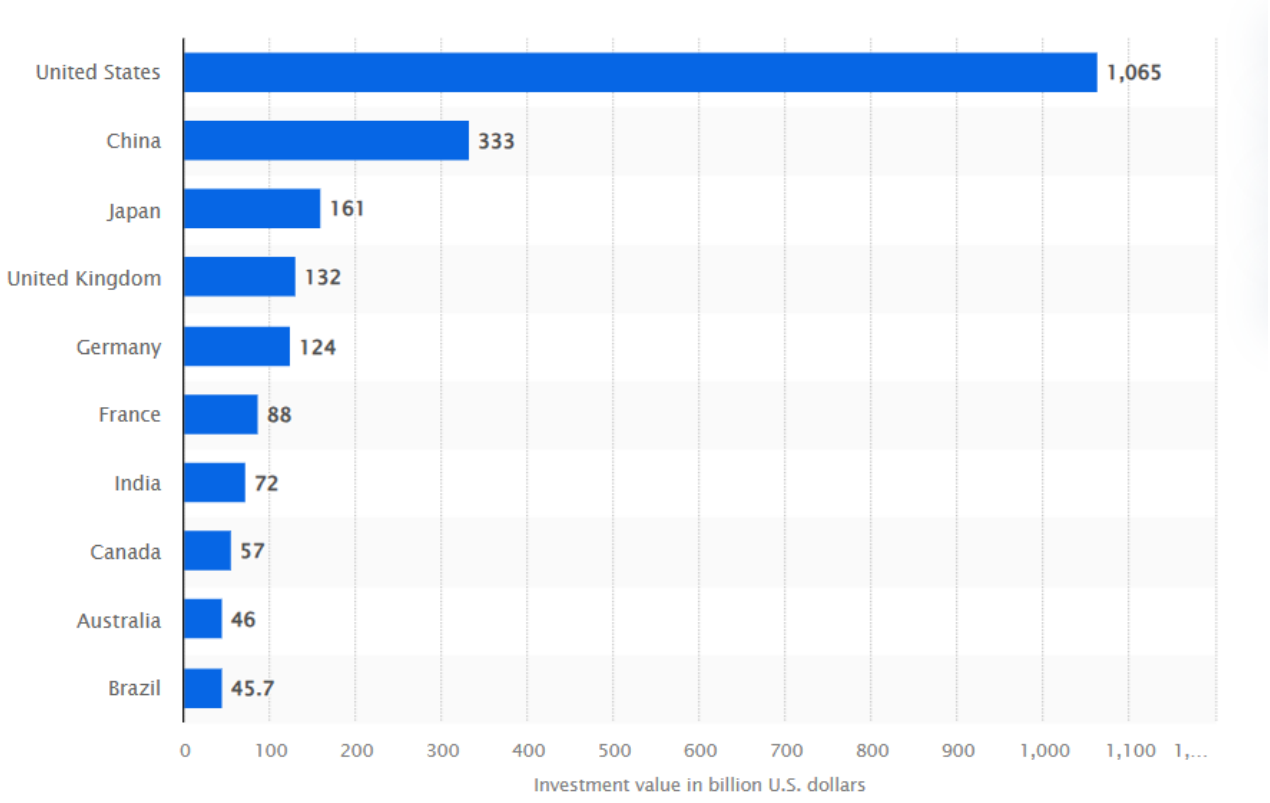


Figure 16. (Source: Statista, 2022).

Investing in Research and Development means the only thing – new technology, that we will see in the upcoming years. Of course, some projects may fail, but with the amount of money spent on investments, some of them can become successful. Also, companies like Huawei and Xiaomi spend

the same amounts on R&D as USA companies: Microsoft, Apple, Google. Even though China, is sanctioned by U.S. The rapidness and growth of the companies, no other company can match. In under then 20years, Xiaomi has already been working and selling products across 100 countries. The companies are following the patterns of older tech beast and by following the success path, it is possible to be successful as well. The source Statista helped to answer some parts of the Investigative question 2, but also it has some similarities with investigative question 1, but still it was a different kind of type. From the author's perspective, investigative question 2, was answered and fulfilled.

### 4.3 Future Prospects for China Technological development on the global level

The future for the country is bright. No matter the sanctions opposed by the U.S. country is still leading in some of the parts in the technological level. With the attitude and investments that are flourished, expansion beyond level we have seen. We will see significant changes in the coming years starting with Artificial Intelligence and Big Data. China has set goals to become leader of this sector and with the plans from the government level it sure we will see them in the future. With the amount of money invested into R&D, talent development, infrastructure, cross continent cooperation with African countries, South America, China has all the votes to become global leader in AI and Big Data. 5G and Telecommunications is also one of the factors we're the country is planning to become a global powerhouse. With the government plan "Made in China 2025" and aims to develop 5G and Internet of Things (IoT), smart vehicles. Companies like Huawei, Xiaomi will help them achieve those goals easily, because as the research showed, the companies are resilient to U.S. imposed sanctions and making more diverse products to have a bigger market share in the global level. Renewable energy is we're the country that is deciding to make the biggest leap according to their plans. From "Made in China 2025" renewable energy 80% will be made in China. The world cannot compete with the manufacturer, because of the prices they can offer, the quantity, quality, and global distribution across the world. With their own created technology, they are resilient to any imposed sanction in the future. At some point, it was seen that China cannot make so good product, but with the 21st century hitting around the 50s, the opinion will be changed, and we will see the People Republic of China as the global leader across the Technology in the various sectors. To conclude, this investigative question to answer and see the real future for this country helped the as well literature review. Especially, the literature from these writers:

- Department of International Cooperation Ministry of Science and Technology (MOST), P.R.China 2017.
- J. Wübbeke, Mirjam Meissner, Max J. Zenglein Jaqueline Ives, Björn Conrad 2016. MADE IN CHINA 2025.

From this literature, the author got opinion about what plans the country is building in the future and what these holds. Furthermore, the personal opinion and expertise in these topics helped the author to answer this research question and design the possible future.

# 5 Conclusions

Writing and analyzing this research topic was truly an interesting experience for the author. At the start of the thesis, it was a question if the investigative questions could be fulfilled, but after the thematic analysis and many more sources, it was clear for the author that the investigative questions could be fulfilled. The final chapter will summarize the report, will highlight the most important key findings, limitations, and future research, reflecting on learning.

## 5.1 Key insights

Academic work focuses on understanding why the technological rise of China happened. What are the reasons behind the successful rise of the country in the technological revolution, no one country has experienced before. It was seen once in a lifetime of such rise. Through literature, the author tried to understand how this technological revolution happened. Using thematic, source analysis, research articles, and journals we're filtered. Within the research topics and investigative questions, the author only focused on the outcomes and text that would help to answer the research main question. In the theoretical framework, a strong background was given, to help further research and find better results. Key activities were mentioned, like historical information, investment strategies, cooperation with companies/countries, migration, future prospects and Chinese technological giants (companies) that rise to the top and is fighting in the global market share. These subchapters, or in other words threshold are the reasons why People Republic of China grew so fast. The figures, number analysis and comparison help the reader better understand the quantitative context of this research.

Based on the thematic and source analysis that was mentioned before, author gather knowledge why are the reasons why the Chinese grew up so fast. Also, the personal experience of the helped to understand and do the key analysis for the main research question. It was mainly two conclusions that could be made from this analysis. The key reasons why it happened are the good strategic thinking of the government, friendly relationship, and investment strategies across the world. Cooperation in different continents with different thinking governments, leading to the new results of the technology. Strategic goal reaching, projects that will let China to be number one in the world of the technology, starting with manufacturing of advanced technology and being the main country. Also, Artificial intelligence leader with setting up standards, how to develop artificial intelligence, standardizing across the world, so the countries would follow. Only positive things can happen with clear goal setup and achievement, and we know that Chinese can reach their goals by the end dates.

## 5.2 Recommendations

Based on the findings of this research topic, recommendations for the businesses and investment companies can be given. Also, countries that want to follow the same successful path that Chinese did. And people who just seek their own interest, why and how the rapidness growth happened. Most of the details provided are relevant for everyone, and from that everyone can make their own conclusions and usage of this research-based bachelor thesis. The main idea was to understand the reasons and the future of the People Republic of China in the technological field. Everyone can adapt these reasons for their better future.

## 5.3 Limitations

It was hard to author to limit this wide topic, and the most relevant information that would help to answer the research question was selected. The research only tried to cover up the main question and investigative questions, because the opinion of technology can vary from country to country, and different personal views of the country. The author followed neutral perspective view, and focused on things that are the most important, to get the results for the research.

## 5.4 Reliability of the research

This research was done step by step by following the Haaga-Helia guidelines and the best other guidance's. The investigation provides the needed exercises for the student to use the skills in professional life if it will be needed. (C.R. Kohtari, 2004). Details we're provided why the selection of research methods was a mix, both quantitative and qualitative. For the theoretical framework, the usage of data was the most relevant to answer the research question and help to support the investigative questions into the other chapters. Investigative questions we're formed from author personal interests, the needs to understand why this phenomenon happened. Moving on to thematic analysis, work tools like Excel we're used to building simple visualizations to support the theoretical framework and do not lose the interest of the reader. Reports we're built step by step by following the Haaga-Helia guidelines, and the author tried to have a neutral perspective view of things, as mentioned before in the chapters. These topics are not new for the author, and of course the previous study knowledge from 2019 which involved academic writing. The research process was always advice from the thesis advisor, for academic guidance.

## 5.5 Suggestion for further research

Regarding suggestions for further research, the author would advise clearly to select a path in the technology and the possible outcomes, for example, how the China will look in 2050, after all the strategic plans we're successfully overpassed. To add, how the economic world will look like in the

future, global market share's, possible products that China can create with their rapid speed and many more. Depending on the research topic, the topic can be widened or narrowed. Based on this, the author selected a wide knowledge of things and did not let the research dive into small details.

### 5.6 Review on information acquisition

Examination of this topic gave the opportunity for author of his own personal interests regarding the reasons for the rapid growth of the country, future possible outcomes. His personal interests we're succeeded, and the understandability and widening knowledge of the world we're also fulfilled.

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# Appendices

Here will be shortlisted, that is worth to mention for the reader and for academic purposes.

### Appendix 1. Government data sources

Most of the data sources that we're used in this bachelor thesis, are from government sites, that countries wrote. More accurate information cannot be found when it is written by the government. Graphs, articles we're used that government published in their own department, starting with P.R. China, EU Commission, Germany. One of the report, China Academy of Information and Communications (2020) clearly stated that the only usage of the sourcing can be, "Source: China Academy of Information and Communications Technology". Anyone who will violate the statement will be accountable.

### Appendix 2. Visualizations in the Research

Most of the visualizations are not made by the author himself, but rather from the web sources that are widely known.

### Appendix 3. Source URL

One of the sources Industry 4.0 – A Glimpse, is pasted a different URL due to long of the link. In that page, the pdf format can be opened.