

The Semiconductor Industry In China: Competition With The United States For Market Leadership And Development

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Abstract

The semiconductor industry has become a hot subject in the present global economic conflict, which is mostly about the relationship between china and the us. One important part of this disagreement has to do with u.s. land. This article looks at how the two nations are competing with each other by focussing on market control, technological innovation, and the strategic objectives they have set for themselves. To put it simply, semiconductors are the parts that make up all modern electrical gadgets. These batteries might power a lot of different kinds of electrical devices, from simple household appliances to advanced military equipment. This is why they need to keep a careful eye on the semiconductor industry's production and supply chains. This is very important for the country's safety and economic growth. One particular reason for this is that semiconductors may be used in a lot of different ways. China has been working hard to reach its objective of becoming a big semiconductor maker. The chinese government has put a lot of money into programs like "made in china 2025" and building up the country's chip manufacturing capability to attain this aim. Other things include political action, supply chain security, and relationships throughout the world. This is the conclusion that was reached after a lot of study. This can be the moment when one comes to this decision. The goal of the project is to provide researchers, policymakers, and people in the semiconductor business a full picture of how the competitiveness of semiconductors is evolving as a result of changes in global economic and technological power. The goal of study is to provide these folks a complete picture.

Keywords: semiconductors, country's safety, technological power, provide researchers, policymakers.

1. Introduction

The semiconductor business is very important to the modern digital economy because it makes new things possible in many other fields, such as computers, telecommunications, ai, and national security systems. The industry is largely too accountable for turning possible new ideas into actual ones, which might explain the predicament. Because there is a growing demand for more powerful processors that are faster, smaller, and use less energy, semiconductors have become a very important strategic asset. Due to this demand, semiconductors are now an important strategic asset. The creation of semiconductors may have started with a need to address this need. This breakthrough has led to a lot of disagreement throughout the globe over the making and distribution of semiconductors. There has been a huge increase in conflict between china and the us over the last several years. The two nations are working very hard to become world leaders in technological innovation and to rely less on foreign suppliers. This disagreement is part of a bigger problem in world politics because more and more people believe that being a leader in semiconductor technology is linked to economic stability, the ability to innovate, and military might. This debate is based on this point of view, to be more explicit. This idea may have been the first thing that made the fight start. The united states has always been in the vanguard when it comes to new ideas in semiconductor design and development (mark & roberts, 2023). This isn't new; it's always been this way. A lot of businesses, including intel, qualcomm, and nvidia, have moved there. Intel is another great

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company in this field. A lot of smaller businesses also use it as their primary office. Most of the foundries that make things are in south korea and taiwan, although they are all around the globe. This phase is a big part of the complete process of making anything. Because of this, the supply chain has become more vulnerable, which has caused problems with the flow of goods and delays in getting products to customers. But china is already working on a national plan to attain its objective of becoming self-sufficient in semiconductors. China has come a long way. Now that all the necessary steps have been taken, a national strategy may be put into action. This plan can need a lot of money to be spent on building factories, doing research, and training workers. Officials in the government have set objectives for the nation, such as becoming the world's top chip maker and relying less on technology imports from other countries. The government plans to meet both of these goals. The "made in china 2025" campaign is one of the country's current efforts to attain this objective. It shows how determined the country is to reach this goal. The primary emphasis of this research, which examines competitive dynamics, is the constantly shifting competition between the us and china in the semiconductor sector. The research was conducted to enhance understanding of the dynamics of the competition. The main purpose of this study is to look at how economic, technological, and geopolitical factors affect each other as the battle goes on. It also looks at the effects on innovation, global exchange markets, and international politics while doing so. The entire process of coming up with new ideas can also be affected. Scholars, legislators, and business executives who want to know how the world's power structures and technology can change in the future need to know a lot about the fight between these two factions. The rivalry has a big impact on how these developments can affect the future. These two companies are incredibly competitive with one other, and their rivalry is the fundamental reason why (tang, 2024).

2. Background of the study

To move technology forward throughout the globe, the semiconductor industry has to grow, but a number of things need to happen first. International collaboration, exchanging information across nations, and building complicated supply chains on a global scale are all things that help. The us has been the world leader in semiconductor technology for many years. This country has come up with new ideas in architecture and design, as well as new ways to protect intellectual property. There are several reasons why this is the case. The us has a strong presence in several sections of the value chain. This is especially true in areas like sophisticated chip design, semiconductor equipment, and electronic design automation (eda) software. Still, this hasn't prevented manufacturing from becoming more globalised. Most of the production is now done in asia. To be more specific, samsung electronics of south korea and the taiwan semiconductor manufacturing company (tsmc) of taiwan are the two businesses that made this. The us has become strategically weak because it depends on factories in other countries, especially now that there are conflicts between countries throughout the world (zhang, 2024). This dangerous scenario has come about because these facilities are very important to the us economy. China, on the other hand, has been able to make quick development in technology and the economy for a long time because it relies on imported semiconductors and manufacturing equipment. This has been the case throughout china's political and economic history. This has always been the case. China has big goals like the "made in china 2025" plan and the national integrated circuit industry development guidelines that aim to make the country self-sufficient in technology. China has made these two proposals public via official statements. Some actions were made to fix the problem after understanding that this dependency was a threat to national security. These businesses may have been successful for a variety of different reasons. There are several things to think about, such as efforts to attract highly trained personnel, government expenditure on a massive scale, and smart foreign acquisitions of digital businesses. Even if this is true, china is still having problems coming up

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with new ways to make things, notably in fields like extreme ultraviolet (euv) lithography. This is because chinese officials keep obstructing the transfer of technology from nations that are allies of the us, which has a domino effect. China and the us are fighting over who should have the last word on technological issues. Both sides want to dominate the market and have the authority to choose who gets to make decisions about technology. The fact that the two countries are becoming more competitive with each other shows that they are becoming closer to each other. Export restrictions, sanctions, and limits on the transit of information have made competition stronger. As a result, supply chains may be disrupted in the future along geopolitical lines. Economic restrictions have also made the competition stronger. To assess the influence of national policy on innovation, international commerce, and the power dynamics within the semiconductor sector, it is essential to comprehend the significant role of foreign technology in this context. The reason is that foreign technology plays a big role in this situation. It is very important to know this in order to judge how each country's policies affect creativity (dorakh, 2024).

3. Purpose of the study

The us and china are in an unending battle for market dominance and technological supremacy in the semiconductor industry. This fight is currently going on in the semiconductor industry. The major thing can be doing throughout the investigation is looking closely at this competition. The research can also focus on how foreign technologies and global supply chains add to this growth. They are doing this to provide additional information. The objective of this study is to analyse the interplay of international commerce, technical progress, and geopolitical dynamics in connection to china's pursuit of semiconductor manufacturing self-sufficiency. The primary aim of this research is to analyse the effects of china's actions on the aforementioned activities. The objective of this study is to evaluate the impact of u.s. policies on semiconductor development in china and the global market by assessing the impacts of export prohibitions, technological constraints, and strategic partnerships. They can do this review to find out how much of an effect these policies have. To achieve this objective, it is necessary to examine the policies implemented by the us government. The primary objective of this study is to ascertain the factors that stimulated china's investment surge. The research also seeks to ascertain the extent of competition the united states used to maintain pressure on china. The study can mainly focus on looking at how much china is spending more on semiconductor research and development and production. The researcher help us understand the strategic efforts made by both nations in great detail. These efforts include trying to make supply chain operations more varied, getting funding for research, and making rules. A research-based analysis of this topic can be given. The main goal is to provide a thorough knowledge of how this technological rivalry affects innovation, the strength of the supply chain, and the future distribution of power in the semiconductor ecosystem throughout the globe. This understanding is essential for accomplishing the goal.

4. Literature review

The semiconductor sector has been studied a lot since it has had a huge effect on contemporary technology, economic growth, and global security. Semiconductors are needed for everything in the digital economy, from computers and cell phones to ai systems and military gear. Semiconductors are the heart of the digital economy, driving new ideas in practically every field. The fact that the value chain for this sector is spread out all over the globe is another element that makes it special. This chain is unique since it may run its business using several sites that specialise on certain industrial sectors. Throughout history, the united states has always been at the top of the list when it comes to inventing new things in many various areas. Chip design, research progress, and equipment construction for semiconductor manufacture are all examples of these fields. But people all around asia, particularly in south korea and

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taiwan, are very interested in the manufacturing business. Because of this reliance, many are worried about the safety of the supply chain. This is even clearer when they think about how sensitive many countries are to global conflicts. Because of this situation, there have been big efforts to bring semiconductor manufacturing back to the us and boost investment in local capacity (park, 2023). This is to lower the risk of potential problems and make sure that the us stays a technical leader. An examination of china's position in the semiconductor competition indicated that the nation's recent economic prosperity was significantly dependent on foreign chips and manufacturing methods. The goal of the study was to figure out where china is in the competition for semiconductors. China has been working hard to improve its own semiconductor sector by putting in place important policies and spending a lot of money. China perceives this dependency as a possible strategic vulnerability, which is why it is doing this. As a result, china has decided to work on improving its own skills in the semiconductor industry. There are a lot of various things that might fit under this umbrella. Examples of these kinds of efforts include building more factories, educating workers, and giving people incentives to be innovative. China has made a lot of progress in this field, but it still has several problems to solve before it can make technologically superior electronic semiconductors. This is especially clear when they think about how china can't get its hands on certain critical industrial innovations and equipment that are presently controlled for export. The research indicates that the semiconductor competition between the us and china involves more than just commercial rivalry; it encompasses technical autonomy and the long-term economic consequences of such autonomy. When they look at all of the study's data, this is the conclusion may can come to. This competitive dynamic might lead to changes in trade ties, the reorganisation of international supply chains, and possibly the creation of new technological ecosystems. Forecasts say that the competitive dynamic can cause these results to happen (milutinović & nikolić, 2023).

5. Research question

- What is the impact of foreign technology on growth with the u.s. for market leadership?
- 6. Research methodology

6.1 Research design

Methodology they used spss version 25 to do the quantitative data analysis. The direction and intensity of the statistical association were determined using the 95% confidence interval and odds ratio. At p < 0.05, the researchers established a criteria that was considered statistically significant. The data's essential features were extracted using a descriptive analysis. When analysing data transformed by computing tools for statistical analysis or data collected from surveys, polls, or questionnaires, quantitative methods are often used.

6.2 Sampling:

Research participants filled out questionnaires to provide information for the research. Using the rao-soft programme, researchers determined that there were 630 people in the research population, so researchers sent out 730 questionnaires. The researchers got 700 back, and they excluded 30 due to incompleteness, so researchers ended up with a sample size of 670.

6.3 Data and measurement:

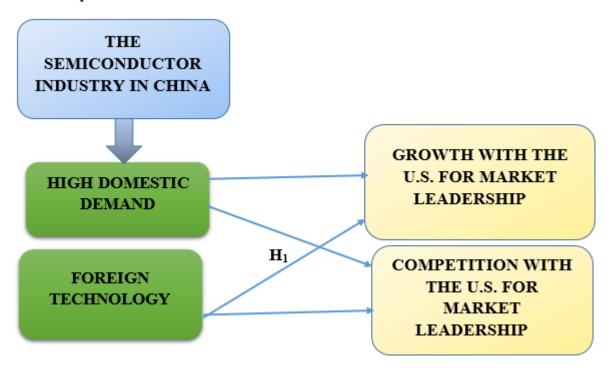
A questionnaire survey served as the principal tool for data gathering in the study. The survey had two sections: (a) general demographic information and (b) responses on online and offline channel variables assessed using a 5-point likert scale. Secondary data was obtained from many sources, mostly on internet databases.

6.4 statistical software: the statistical analysis was conducted using spss 25 and ms-excel.

6.5 statistical tools: to grasp the fundamental character of the data, descriptive analysis was used. The researcher is required to analyse the data using anova.



7. Conceptual framework



1. Result

***** Factor analysis

A common use of factor analysis (fa) is to uncover latent variables within observable data. In the absence of definitive visual or diagnostic indicators, it is customary to use regression coefficients for evaluations. In fa, models are crucial for success. The objectives of modeling are to identify errors, intrusions, and discernible correlations. The kaiser-meyer-olkin (kmo) test is a method for evaluating datasets generated by multiple regression analyses. The model and sample variables are confirmed to be representative. The data indicates redundancy, as seen by the figures. Reduced proportions improve data comprehension. The kmo output is a numerical value ranging from zero to one. A kmo value ranging from 0.8 to 1 indicates a sufficient sample size. The below quantities are considered suitable, according per kaiser: the subsequent approval standards established by kaiser are as follows:

A lamentable 0.050 to 0.059, insufficient 0.60 to 0.69

Middle grades often span from 0.70 to 0.79.

Exhibiting a quality point score between 0.80 and 0.89.

They are astonished by the range of 0.90 to 1.00.

Table 1: kmo and bartlett's test for sampling adequacy kaiser-meyer-olkin statistic: 0.957

The outcomes of bartlett's test of sphericity are as follows: the degrees of freedom for the chisquare test are around 190, with a significance level of 0.000.



Table 1: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.957
Bartlett's Test of Sphericity	Approx. Chi-Square	3252.968
	df	190
	Sig.	.000

This illustrates that claims made for sampling reasons are valid. Researchers used bartlett's test of sphericity to assess the significance of the correlation matrices. A sample is deemed good based on the kaiser-meyer-olkin criteria when the result is 0.957. The p-value derived from bartlett's sphericity test is 0.00. The correlation matrix is not an identity matrix, as shown by a statistically significant outcome from bartlett's sphericity test.

❖ Independent variable

• The semiconductor industry in china

This study can focus on the semiconductor sector, especially in china, as the independent variable. This factor determines the potential, direction, and growth of china's domestic semiconductor sector. Also, it has to figure out where the industry is going. Also, it is responsible for what has previously been expressed. This phenomena has come to be because of a number of things. These include the growth of local manufacturing companies, government programs to hire talented people, research and development projects, and rules that strive to make people less dependent on foreign technology. This set of causes includes all of these things. China's semiconductor industry is a big part of the country's economic development. It also decides how successfully china can compete with the us for market supremacy. This is because the semiconductor industry is very important to china's economic growth. It's clear that this performance has hurt china's capacity to compete with the us a lot. Several elements directly influence the dynamics of international rivalry. The amount of money invested, the level of technological progress, and the success of programs that encourage people to be selfsufficient are some of these factors. In this research, "this variable" refers to how the innovation and manufacturing capabilities of chinese semiconductors affect the country's market position and its capacity to compete with the united states in engineering and technology. This investigation seeks to ascertain the extent to which these factors influence china's market position (malkin & he, 2024).

***** Factor

Foreign technology

Technology from other nations is a very essential part of china's semiconductor industry that has a big impact on its growth and competitiveness. This part is really important for figuring out how the industry can expand and survive. This portion is very important for making semiconductors. It has knowledge, tools, ip, and manufacturing methods that were created outside of china. This includes not just the information but also the tools and procedures needed to make things. Chinese producers can't make the goods that were previously stated since they don't have the right materials. From the beginning, china has relied on foreign-made chips, specialist tools like lithography machines, and the expertise and experience of foreign

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enterprises to suit its own needs. This has always been true in china. From the beginning of recorded history to today, this is how things have always been in china. China's ability to improve its semiconductor knowledge depends on how easy it is for them to get foreign technology or how much it is limited (peters, 2023). Chinese businesses can improve their production efficiency and reduce the innovation gap when they can receive new technology from well-known corporations in other countries. This is because they can easily get to the technology. But export limits, fines, and a lack of information flow might make research tougher and make it difficult to build sophisticated nodes and high-performance processors. These considerations may also make it harder to make complicated nodes. One possible result of these particular concerns is that sharing information may become more difficult. This research indicates that foreign technology may significantly influence the relationship between the expansion of china's semiconductor sector and the country's competitiveness compared to the us. This method helps us understand how china's reliance on foreign resources and global collaboration, or lack thereof, affects its development towards technological self-sufficiency and its ability to compete for global market dominance. They can observe the things that affect china's growth from here (janjua, 2024).

❖ Dependent variable

• Growth with the u.s. for market leadership

This study is predicated on the semiconductor sector as a contentious arena between the us and china. This growth is the dependent variable in the research. It is a depiction of the result that is influenced by the advancement and enhancement of china's domestic semiconductor industry and its engagement with international technology. This variable has a picture of the outcome. There are numerous aspects to the competition for market dominance. One of these traits is the capacity to set worldwide industry standards, which goes along with being at the forefront of technical progress, managing important elements of the supply chain, and running the global semiconductor market. The united states has always been the leader in making semiconductor equipment, protecting intellectual property, and designing sophisticated devices. This is true in all of these areas. But china is also making smart investments and passing national laws to cut down on imports, increase its own manufacturing capacity, and compete with the us in this important sector. China is working hard to achieve all of these objectives. The aim of this study is to measure the impact of alterations in china's semiconductor industry—a sector that is responsive to fluctuations in foreign technology access and regulations—on global competitiveness. This dependent variable helps us reach the aims of this study. China's growing power might lead to a smaller technology gap, a change in global supply chains, and a threat to america's long-standing supremacy in the semiconductor business. One of these two things may happen, and american soil would be undermined (hah, 2024).

• The relationship between foreign technology and growth with the u.s. for market leadership:

China depends significantly on technology from other nations to growth with the us for dominance in the semiconductor business. This is because china gets its technology from other countries. This is especially true when they think about america. This is a very important point to make when talking about the states that make up the usa. The more technology china can get from other countries, the better its manufacturing capacity, innovation rate, and worldwide competitiveness can be. This relationship is very important. Modern manufacturing equipment, tools for eda, and intellectual property connected to semiconductor processing are all examples of technology that comes from other countries. To put it simply, these are only a few examples. China might benefit greatly from larger-scale access to this technology. It could make high-performance computers quicker, rely less on imports, and have a stronger position in the market. China can achieve all of these objectives. It's crucial to remember that the connection

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isn't linear; this is a key element that people frequently forget. The us and its allies may restrain china's economic development by limiting the transfer of technology via export restrictions and penalties. At the same time, this would help the us keep its competitive edge. This is also possible since the us can preserve its competitive advantage. Fines and limits on exports are two examples of things that belong within this group. The government put these limits in place to protect national security and block the transfer of sensitive technology that may give china military power equal to or greater than that of the us (wang, 2023). One of the other reasons for putting these limits in place is to keep important technical information from getting out. Political and economic situations throughout the world decide how much foreign technology can help or hurt. This is because foreign technology can do both of these things. This is because a lot of foreign technology may be both helpful and harmful at the same time. This link provides data indicating that foreign technology has a moderating function in the competition for market dominance. Since the connection is present, anything might happen. It is affecting the pace of development in the semiconductor industry throughout the globe, which in turn undermines china's capacity to come up with new ideas. The reason for this is because it has an effect on both of these things. The reason for this is because it affects both of these things. Limiting access may help the us remain on top for longer. This is because limiting access would make china rely more on its own new ideas at home. On the other hand, making technology more available to people throughout the globe might speed up china's rise to power and make the us and china compete more for a bigger piece of the world's market and technological leadership. It's possible that these two things can happen. The chinese government can benefit in either situation (bendtsen, 2025).

On the basis of the above discussion, the researcher formulated the following hypothesis, which was analyse the relationship between foreign technology and growth with the u.s. for market leadership.

" h_{01} : there is no significant relationship between foreign technology and growth with the u.s. for market leadership."

" h_1 : there is a significant relationship between foreign technology and growth with the u.s. for market leadership."

ANOVA Sum Sum of Squares df Mean Square F Sig. 136 5655.517 1055.921 .000 Between Groups 39588.620 533 5.356 Within Groups 492.770 669 Total 40081.390

Table 2: H₁ ANOVA Test

This investigation yields remarkable results. The f value is 1055.921, attaining significance with a p-value of .000, which is below the .05 alpha threshold. This signifies the "h₁: there is a significant relationship between foreign technology and growth with the u.s. for market leadership." Is accepted and the null hypothesis is rejected.

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9. Discussion

The survey results underscore the substantial influence of the semiconductor sector as a worldwide economic driver and a wellspring of technical prowess. This is to help others understand why this area is vital. China is spending more and more on semiconductor r&d and productivity, which is closing the technology gap between china and the us by a large amount. The findings back this up. Access to foreign technology has a big effect on this development, even though it may both help and hurt it. China's new export curbs and sanctions have made it harder for the nation to manufacture cutting-edge semiconductors. Because of this, the government has had to speed up its own research and come up with home-grown alternatives. China has been able to do well in the semiconductor business because it has a long history of getting technology from other nations. The us and china are also in a geopolitical battle for global control, which shows how hard their economies are working. In this sector, the us and china are fighting for business. The united states of america is still the best in the world when it comes to intellectual property, advanced design, and the most valuable aspects of the semiconductor supply chain. This is true even if a number of other countries have taken over these areas. But this doesn't necessarily mean that things can go well; it depends a lot on where the parts are made, notably in taiwan and south korea. The rising tensions in the asia-pacific area make this argument particularly clearer. China, on the other hand, plans for the long term and gets a lot of help from the government. This method might lead to a semiconductor ecosystem that is more adaptable and able to stand on its own. The results of this research clearly show that the global supply chain can probably have to change because of new competitors. This is the conclusion that is true when they look at the data. This might lead to the formation of two ecological systems that are completely different from each other. One ecosystem can focus on the us and its allies, while the other can focus on china's skills in making things at home. Supply chain fragmentation might make supply chains safer for everyone, but it could also make it harder for people to work together and share knowledge across borders. This could slow down global innovation. This might lead to either a good or poor outcome.

10.Conclusion

The growth of the semiconductor industry has become a major point of competition between businesses, and it is also one of the primary issues of disagreement between the us and china. People think that this disagreement is mostly over the growth of the semiconductor sector, which many people consider as a strategically important aspect of the international economy. The research team behind this study wanted to learn as much as they could about the strategies that the lavishly financed and state-supported chinese semiconductor sector used to break links with international suppliers and speed up the country's technical growth so that it might catch up to the us. Even if a lot has been done, there are still things that need to be done. That is the other side of the coin. Some examples of these kinds of problems include getting new manufacturing equipment and making highly intricate chips that are equal in quality. Taking into account statistics from other countries, it seems that foreign technology plays two roles in driving this rivalry. Because of the restrictions put in place by the us and its allies, china has forced to rely on its own ingenuity to get over these problems. China has always sped up its growth by getting access to foreign technology and knowledge. Because of this, china has been able to speed up its social growth. But these limits have made things harder, and problems have started to show themselves. Both countries are behaving in ways that safeguard their supply chains, intellectual property, and strategic advantages since these are their top interests. This is making businesses more and more competitive. The continued competition between the us and china in the semiconductor business is expected to remain a major force behind innovation for

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a long time to come. They should think about this. At the same time, it might potentially make the market more fragmented and cause more geopolitical problems. They need to think about something like this. One of the most important things to take away from this research is that the future of the global semiconductor business can be shaped not just by technical advances but also by government actions, trade rules, and international collaboration. This is one of the most important things they can learn. This is one of the most important lessons that can be taught. In conclusion, it is necessary to find a balance between the two conflicting forces of cooperation and rivalry if the semiconductor business wants to keep helping the global economy expand and new technologies to be made. When they speak about policies, it mean the actions taken to create programs that can improve the country's ability to achieve things while still keeping good relationships with international friends. This shows how important it is for everyone in the corporate world to be creative, persistent, and adaptable. This is especially true when they think about the global market, which is always changing and very competitive.

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