



Department of Digital Business

**Journal of Artificial Intelligence and Digital Business (RIGGS)**

Homepage: <https://journal.ilmudata.co.id/index.php/RIGGS>

Vol. 4 No. 2 (2025) pp: 7-13

P-ISSN: 2963-9298, e-ISSN: 2963-914X

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## Global Supply Chains and Geopolitical Realism: Huawei's Survival Strategy against the US Ban

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### **Abstract**

*The US policy of isolating the Chinese technology company Huawei has significantly transformed the company's global business operations. This conflict extends beyond business interests, touching on broader geopolitical dynamics between states. This research aims to examine the impact of the US ban on Huawei's global supply chain and analyze how the company has adapted through strategic responses. Employing a descriptive qualitative method with a literature study approach, this study analyzes secondary data from various sources. Two main theoretical frameworks guide the analysis: Global Supply Chain Theory, which explores Huawei's dependency on US-origin technological components, and Realism Theory in International Relations, which interprets US actions as an effort to maintain its hegemonic position in the global technological order. The findings reveal that the US ban significantly disrupted Huawei's access to critical technologies, especially semiconductor chips. In response, Huawei adopted a survival strategy centered on supply chain diversification and domestic innovation. The research concludes that although the ban caused substantial short-term setbacks, Huawei demonstrated resilience through long-term strategic adaptation. The novelty of this study lies in its integration of political economy and international relations perspectives to explain how a global technology company navigates geopolitical pressures and supply chain vulnerabilities.*

*Keywords: Boycott, China, Huawei, Technology, United States*

### **1. Introduction**

In recent years, global trade dynamics have become increasingly complex, driven by shifts in power among major global actors. One of the most prominent manifestations of this shift is the ongoing technological rivalry between the United States and China, the world's two largest economies. This competition has moved beyond mere economic exchanges, involving national security, geopolitics, and the future of technological innovation.

The US decision to impose restrictions on Huawei, one of China's largest technology companies, represents a flashpoint in this growing confrontation [1]. By boycotting Huawei, the US has sought to curb China's technological advancement, especially in 5G and telecommunications, where Huawei holds significant competitive advantage [2]. The US boycott of Huawei highlights broader trends in international relations where economic measures are increasingly used as tools of geopolitical strategy. Sanctions, embargoes, and other forms of economic statecraft have long been mechanisms for influencing state behavior, but in the 21st century, these strategies are increasingly focused on technology [3].

As global economies become more interconnected through technological innovation and digital infrastructure, control over key technology sectors, such as semiconductors, data networks, and AI, is seen as critical to national power [4]. The US government's measures against Huawei, initially framed as concerns about national security. This action quickly expanded into a full-scale economic campaign aimed at restricting Huawei's access to critical technologies. This policy has fundamentally reshaped the company's operations and strategies on the global stage [5].

The rationale behind this research stems from the need to understand not only the economic but also the geopolitical and strategic implications of such technological conflicts. Huawei's case represents a crucial intersection between global supply chains, national security concerns, and the international political economy. Global Supply Chain Theory underscores how deeply intertwined industries are, especially in technology [6], and Realist Theory provides an explanation for the US strategy: maintaining hegemony by controlling critical technological resources [7].

From the US perspective, the boycott is a strategic move designed to maintain its dominance in the global technological order, which aligns with the realist framework in international relations. Realist theory posits that states are primarily concerned with maintaining power and security, and the US sees China's technological rise as a potential threat to its hegemony [8]. The US's actions against Huawei can thus be interpreted as an effort to limit China's technological ascent and ultimately preserve the balance of power in its favor [9].

This research would be analyzed by Global Supply Chain Theory. Global Supply Chain Theory provides valuable insights into the advantages and risks of interdependence in global supply chains, as the Huawei done. While international sourcing has enabled firms to maximize efficiency and minimize costs, it also creates vulnerabilities when access to critical components is threatened by geopolitical events [10]. In adapting to these disruptions, firms like Huawei illustrate how businesses can navigate the trade-offs between efficiency and resilience by diversifying supply sources and investing in domestic capabilities. The Huawei case serves as an important example of how Global Supply Chain Theory applies to real-world scenarios, highlighting both the potential and challenges of operating within a globally connected economy.

Furthermore, Global Supply Chain Theory emphasizes the competitive advantages that come from technological interdependencies across borders. For instance, in a globally integrated supply chain, firms can leverage innovations and specialized skills from various regions, improving both the quality and cost-effectiveness of their products [11]. However, these advantages can be undermined by protectionist policies or political conflicts that limit access to international suppliers and markets. Huawei's situation exemplifies this, as the company's growth was supported by access to international markets and suppliers until the US restrictions forced it to rethink its supply chain strategy [12]. The theory suggests that companies facing such geopolitical pressures may either exit certain markets or innovate domestically to fill the gaps left by lost access to foreign technology.

Others theory, Realism Theory provides a framework to understand the competitive dynamics in international relations, where states prioritize their power and security in an anarchic environment. The US-China technological rivalry exemplifies realism's principles, highlighting the drive of major powers to maintain influence and counterbalance emerging threats to their position. This perspective helps explain the motivations behind state actions in critical domains like technology, where the implications of power shifts extend beyond economics to national security and geopolitical influence

Furthermore, Realism Theory posits that the competition between great powers, such as the United States and China, is driven by security concerns. As China's technological advancements grow, the US perceives these developments as a potential threat to its national security and influence over global technological standards [13]. Realist theory explains that this perceived threat leads the US to take preventative actions, such as sanctions, to limit China's capabilities in strategic sectors. These actions align with the realist concept of security dilemma, where the actions taken by one state to secure itself lead to increased insecurity for another, perpetuating a cycle of competition.

Realism also emphasizes the role of self-help, where states rely primarily on their resources to safeguard their interests and security. Huawei's adaptation to the US boycott by increasing investments in domestic R&D and developing independent technological capabilities illustrates how realism shapes responses to power struggles in international relations [8]. By strengthening domestic innovation and seeking technological self-sufficiency, China and its major companies are acting in alignment with the realist view of state resilience amid external pressures. This drive for self-reliance aims to reduce China's dependence on foreign technology and reinforce its strategic position in the international system.

One of the core tenets of realism is the concept of power balancing, where states strive to prevent any single nation from achieving hegemony. For example, the US restrictions on Huawei, a leading Chinese technology company, can be viewed through the lens of realism as an effort by the United States to curtail China's rising influence in the global technology sector. From this perspective, the US aims to maintain its dominant position and counterbalance China's growing power, particularly in areas with strategic implications like technology and cybersecurity [14]. Realist theory posits that the US seeks to ensure its continued hegemony in the technological order to prevent China from gaining a geopolitical advantage that could challenge US dominances.

From Huawei's perspective, the boycott presents both a challenge and an opportunity. Initially, the company faced severe disruptions to its supply chain, especially in accessing semiconductor chips, which are essential for its products. However, Huawei has shown resilience through strategic adaptation, including diversifying its suppliers and accelerating its domestic innovation capabilities. This has been a key factor in Huawei's survival and continued growth, despite being cut off from key international markets. This shows the urgency of this research, to examine the impact of the US boycott on Huawei's global business, and how the company is adapting to changes in the

international political and economic environment. The novelty of this research lies in its interdisciplinary approach, combining perspectives from both political economy and international relations to analyze the intersection of global supply chains and geopolitical tensions.

## 2. Research Methods

This research employed a descriptive qualitative approach, specifically utilizing a literature review to analyze the impact of the US boycott on Huawei's global business and its adaptive strategies. The qualitative methodology allowed for an in-depth examination of secondary data from reputable sources, including academic journals, industry reports, and policy analyses. This method was chosen to provide a nuanced understanding of the geopolitical and economic factors influencing Huawei's supply chain and strategic adjustments in response to the boycott.

The two central theories used—Global Supply Chain Theory and Realism Theory in International Relations—guided the analysis of Huawei's dependencies on international suppliers and the US's motivations to maintain technological hegemony. The literature study method enabled the research to synthesize insights from multiple sources, offering a holistic view of how Huawei adapted by diversifying its supply chain and enhancing domestic innovation. This approach is suitable for assessing complex international issues, as it provides both contextual depth and theoretical grounding, leading to conclusions that link Huawei's business adaptations to broader trends in global political economy and international relations.

## 3. Results and Discussions

### 3.1. Impact of US boycott on Huawei

The U.S. boycott significantly disrupted Huawei's global supply chains. In 2018, Huawei reportedly spent around \$70 billion on components from more than 13,000 suppliers worldwide, with approximately \$11 billion going to U.S.-based firms such as Qualcomm, Broadcom, Microsoft, and Google. When the U.S. government restricted Huawei's access to these critical suppliers, the company faced immediate challenges in sourcing essential technological components, particularly high-performance chips [3]. Following the restrictions, Huawei's access to these components was effectively cut off, leading to a 29% decrease in its smartphone shipments in 2020, with the company falling from the world's leading smartphone maker in Q2 2020 to sixth place by early 2021 [15].

The impact on Huawei's telecommunications equipment was equally severe, with revenue from its consumer electronics sector dropping by 16% in 2021 compared to the previous year. Semiconductor shortages were particularly damaging, as Huawei had relied on Taiwan's TSMC, one of the world's leading chip manufacturers, for nearly 80% of its high-performance chip supply before the US sanctions [16]. However, due to the US restrictions, TSMC was prohibited from supplying Huawei, leading to a shortage that forced the company to delay or scale down multiple product lines [2]. By the end of 2021, Huawei's revenue had dropped by approximately 28.6%, with reported earnings of ¥636.8 billion (USD 99.6 billion), down from ¥891.4 billion (USD 140 billion) in 2020 [17].

The ban also cut off Huawei's access to critical U.S. technologies, including Google's Android updates and apps such as Gmail, Google Maps, and the Play Store. This severely affected Huawei's competitiveness in international smartphone markets, especially in Europe and Southeast Asia, where these services are essential to user experience [18]. The U.S. sanctions led to a significant decline in Huawei's overall revenue. According to a report by The Economic Times (2022), Huawei's revenue fell by nearly 29% in 2021, dropping from CNY 891.4 billion (USD 136 billion) in 2020 to CNY 636.8 billion (USD 99.9 billion) in 2021. This marks one of the largest year-on-year declines in the company's history and was primarily attributed to restrictions on accessing key components, especially semiconductor chips. The consumer electronics business, which includes smartphones, was the hardest hit, reporting a 50% decline in revenue due to the inability to source advanced chips and the absence of Google Mobile Services in overseas markets. Consequently, Huawei's position in the global smartphone market fell significantly, with the company losing its place among the world's top five smartphone vendors by the end of 2021 [19].

In response to these significant disruptions, Huawei implemented a series of adaptive strategies to diversify its supply chain and reduce dependence on US-origin technology. The company began investing heavily in domestic research and development (R&D), allocating over ¥140 billion (USD 21.7 billion) to R&D in 2021 alone, accounting for more than 22% of its total revenue. This was a 30% increase in R&D spending from the previous year, marking a clear shift towards strengthening domestic innovation capabilities [20].

One of Huawei's most notable achievements in this adaptation process was the launch of its proprietary HarmonyOS, an operating system developed in-house as an alternative to the Android OS, which Huawei could no longer use due to US restrictions. By the end of 2022, HarmonyOS had been installed on over 100 million devices, signaling Huawei's success in reducing reliance on foreign operating systems [17]. Additionally, Huawei invested in domestic semiconductor manufacturing partnerships to compensate for lost access to global suppliers. This included increased collaboration with China's Semiconductor Manufacturing International Corporation (SMIC), which, despite facing limitations in producing high-end chips, was able to provide sufficient components for Huawei's mid-range devices [21].

Huawei's ability to adapt and stabilize its operations under adverse conditions is a testament to the company's resilience in the face of significant supply chain challenges. While the boycott initially led to a sharp decline in revenue and market share, Huawei's investment in domestic innovation and supply chain diversification allowed the company to maintain a substantial market presence, particularly in China, where it retained nearly 40% of the smartphone market share by the end of 2022. These strategies underscore how Huawei managed to counterbalance the immediate impacts of the US boycott through long-term, strategic adjustments in its business model and supply chain operations. This condition shows how significant the impact of the US boycott is on Huawei's global business activities. Therefore, in order to maintain its business existence, Huawei must do some strategies to cover the various losses it has experienced.

### 3.2. Global Supply Chains of Huawei

Global Supply Chain Theory frameworks offer critical insights into the technological interdependencies and strategic geopolitical considerations that have shaped this case. Global Supply Chain Theory emphasizes the intricate web of international dependencies that define today's technology sector, where firms rely on a globally distributed network of suppliers and resources to maintain competitive advantage. Huawei, like many technology companies, depends heavily on a supply chain that spans multiple countries, particularly for high-value components such as semiconductor chips, software, and telecommunications hardware. The theory suggests that disruptions at any point in this chain can have significant ripple effects, impacting production timelines, cost structures, and ultimately, the company's ability to deliver products to the market. The US boycott, by targeting Huawei's access to critical technology components, underscores the vulnerability of global supply chains to political interventions, as well as the potential for these interventions to shape market outcomes [22].

Global Supply Chain Theory explores the intricate and interconnected nature of modern supply chains, where firms rely on cross-border networks of suppliers, manufacturers, and distributors to operate efficiently and remain competitive [4]. This theoretical framework focuses on how supply chains, especially in the technology sector, are deeply embedded within a globalized system of production and trade. As businesses source inputs from a wide range of countries, they benefit from the efficiency and cost-savings associated with specialization, where each part of the supply chain contributes based on comparative advantage [23]. This interconnectedness, however, also introduces vulnerabilities, particularly when political or economic factors disrupt the flow of goods and services.

In recent years, the geopolitical landscape has increasingly influenced global supply chains, challenging traditional notions of uninterrupted trade and production. For example, the US-China trade tensions and resulting sanctions have exposed the limitations of global supply chains, as firms that rely on critical components from a single country face heightened risks of disruption. Global Supply Chain Theory asserts that in such a complex network, interruptions in one region or for one component can cascade throughout the entire system, impacting firms' ability to produce, market, and deliver products [24]. This is particularly true in the technology sector, where companies such as Huawei depend on specialized components like semiconductor chips, many of which are controlled by just a few global players. Supply chain interruptions, in this context, can lead to major delays, cost increases, and production limitations that ripple across the global market.

Global Supply Chain Theory also suggests that firms face trade-offs between efficiency and resilience. While global sourcing can optimize costs, it increases vulnerability to disruptions caused by geopolitical issues, trade wars, or natural disasters [25]. In recent years, many companies have started shifting their approach from single-source dependency toward a more diversified supply chain to manage these risks better. Huawei's response to the

US boycott is an example of such an adaptive strategy, as the company sought to mitigate its dependency on American suppliers by investing heavily in domestic innovation and forming partnerships with other semiconductor providers in Asia. These adjustments align with the theory's assertion that diversification is a key strategy for enhancing supply chain resilience in the face of external pressures [26].

Moreover, Global Supply Chain Theory highlights the role of national policies and international relations in shaping supply chain structures. In the case of Huawei, the company's reliance on international suppliers became a vulnerability when the US imposed sanctions, restricting Huawei's access to essential technology components like chips produced by Taiwan's TSMC [5]. According to this theory, the response of countries to economic and political disruptions is a critical factor that affects supply chain dynamics. Nations have become more conscious of "technological sovereignty," prioritizing domestic capabilities over dependence on foreign suppliers to secure their interests in strategic industries. Huawei's increased focus on domestic semiconductor development in collaboration with China's SMIC illustrates this trend toward building local capacity to reduce reliance on global supply chains [27].

For companies like Huawei, adapting to supply chain disruptions requires strategies that address both immediate operational needs and longer-term resilience. Huawei's response has been to diversify its suppliers and invest heavily in domestic innovation, a strategic shift that aligns with broader trends in technology sovereignty, where nations seek to reduce their dependence on foreign technology. By increasing domestic capacity in key areas such as chip manufacturing, Huawei has attempted to mitigate the risks associated with geopolitical tensions, illustrating the theory's assertion that global supply chains are susceptible to fragmentation amid political conflicts.

### **3.3. The US Boycott Analysis from Realist Theory**

In parallel, Realist Theory in International Relations provides a lens through which the US's actions against Huawei can be understood. Realism posits that states act to maximize their security and maintain power, particularly when confronted with rising challengers [13]. The technological sector, especially in areas like 5G, artificial intelligence, and advanced semiconductor production, is increasingly viewed as a strategic domain central to national power and economic security. From a realist perspective, the US boycott of Huawei reflects a strategic calculation to curb China's technological capabilities and maintain American dominance in the global technology order. The US's actions illustrate how states leverage economic instruments, such as sanctions and trade restrictions, as tools to secure their interests and limit the influence of competitors.

The realist framework also suggests that the US-China technology rivalry is part of a larger competition for global influence, where control over key technology sectors is seen as essential to maintaining international hegemony. For Huawei, this international struggle places it at the intersection of broader geopolitical rivalries, forcing the company to navigate both economic challenges and political pressures [14]. By focusing on domestic innovation, Huawei's strategy aligns with China's broader national policy aimed at achieving technological self-sufficiency, a response to the US's attempts to exert pressure through supply chain restrictions [28].

Together, these theoretical perspectives, Global Supply Chain Theory and Realist Theory highlight the complex dynamics at play in the Huawei case. While Global Supply Chain Theory emphasizes the vulnerabilities and interdependencies within the global technology sector, Realist Theory offers insights into the strategic motivations of states seeking to preserve power and limit the influence of rivals. This combination of theories provides a nuanced understanding of how Huawei, as a global technology company, has had to adapt its strategies in response to geopolitical pressures, navigating both the economic challenges of supply chain disruptions and the strategic imperatives of a shifting global power structure.

## **4. Conclusion**

This research concludes that the US boycott had a profound and immediate impact on Huawei's global business operations, particularly in disrupting its access to critical technologies such as semiconductor chips. The sanctions severely disrupted Huawei's global supply chain by severing ties with major U.S.-based suppliers and international partners. As a result, the company experienced significant declines in revenue, market share, and production capacity, especially in its consumer electronics segment. However, Huawei's response highlights its strategic resilience under geopolitical pressure. By diversifying its supply chain and investing heavily in domestic innovation, Huawei managed to mitigate long-term vulnerabilities. The company intensified its R&D investments, developed proprietary technologies, and reinforced its role in China's broader push for technological self-sufficiency. This study provides a nuanced understanding of how a global technology firm navigates both supply chain disruptions and great-power rivalry, particularly under the lens of Global Supply Chain Theory and Realist

perspectives in International Relations. These theoretical frameworks help explain both the external political motivations behind the U.S. sanctions and the internal strategies adopted by Huawei to survive and adapt. Ultimately, this research offers valuable insights for businesses and policymakers on how technological conflicts rooted in geopolitical competition can reshape global supply networks, accelerate domestic innovation, and redefine strategic business models in the digital age.

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