

ASSESSING ECONOMIC ESPIONAGE ALLEGATIONS AGAINST
HUAWEI AND PROTECTING U.S. CYBERSECURITY

by

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A THESIS

Presented to the Department of Global Studies & Chinese
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Arts

February 2024

An Abstract of the Thesis of

Evelyn Woo for the degree of Bachelor of Arts
in the Department of Global Studies & Chinese to be taken March 2024

Title: Assessing Economic Espionage Allegations Against Huawei
and Protecting U.S. Cybersecurity

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This paper investigates long-standing allegations against Huawei Technology Co., Ltd., a Chinese telecommunications giant, for receiving support from the Chinese Communist Party (CCP) to commit economic espionage against the United States Government. By analyzing Huawei's public statements, U.S. federal documents, news articles, and scholarly articles, the paper examines evidence from both sides of the debate on whether or not Huawei has spied against the U.S. to advance its fifth-generation (5G) technology. In addition, the paper evaluates the global impact of the U.S. government's actions in response to Huawei's espionage allegations. Furthermore, the paper proposes the next steps that the U.S. should take to strengthen its high-technology sector and promote its national security interests.

Keywords: economic espionage, fifth-generation technology, national security

Acknowledgments

I would like to express my sincere gratitude to Professor Daniel Buck for advising me on my thesis project for over a year, despite the challenging circumstance that I was abroad and away from campus during most of it. Thank you for your dedication to my academic success and unwavering support throughout this process. You have provided invaluable guidance and expertise to help shape the outcome of my research. I also want to thank Professor Brian McWhorter for agreeing to work on this project as my CHC Thesis Representative. Thank you for your flexibility and willingness to serve on my committee. I am also thankful for my current and former CHC Advisors, Professor Jesse Feddersen and Professor Michael Moffitt. Thank you for encouraging me and keeping me on track to finish the honors program. I also need to thank Miriam Jordan, the CHC Academic and Program Manager. Thank you for consistently checking in on my thesis progress, reminding me of important deadlines, and offering helpful resources.

Finally, I would like to thank my friends and family for their continuous support. Without each and every one of you, I would not have become the person I am today. I am excited to share this project with you all and continue growing as a global scholar.

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Introduction

The Biden-Harris Administration emphasized in the 2022 National Security Strategy: “We are in the midst of a strategic competition to shape the future of the international order.” Despite the United States’ commitment to managing a level playing field with democratic principles, China’s autocratic governance allegedly jeopardizes global peace and welfare (The White House, p. 1, 2022b). Although other smaller authoritarian powers also act in “aggressive and destabilizing ways,” “China presents America’s most consequential geopolitical challenge” (p. 11). In other words, Beijing’s ambition to become the world’s leading power by strengthening its technological capacity threatens the U.S.’ current hegemonic position.

Notably, Huawei Technologies Co., Ltd, a Chinese telecommunications giant, drives China’s success across the newest 5th generation (5G) cellular network. Huawei is the world’s third-largest supplier of 5G networks, trailing behind Western vendors Ericsson and Nokia. At Huawei's 2021 Global Analyst Summit, the company claimed to have built over 140 5G networks in 59 countries. In terms of cumulative 5G small cell shipments, Huawei takes the lead, primarily attributable to its dominant position in the domestic market. Huawei claims to have secured more than a thousand “corporate” 5G contracts across twenty industries (Keith, 2022).

For over two decades, U.S. government officials have raised cybersecurity concerns over Huawei, citing its ties to the Chinese Communist Party (CCP) and military, sanctions violations, and unfair trade policies that enabled its international expansion. The U.S. is especially wary of Huawei’s potential to espionage U.S. and foreign networks (Gallagher, p. 2, 2022). Economic espionage is defined as the “state-sponsored theft of confidential information belonging to foreign companies.” The information is then passed to domestic companies to enhance competitiveness (Hovanic, p. 360, 2022).

Since 2018, suspicions of Huawei's economic espionage have spread worldwide, resulting in concrete actions against the company. In particular, the U.S. government has been coordinating a global effort to ban Huawei equipment in 5G networks and prevent companies from trading with Huawei (Lysne et al., p. 3, 2019). On the other hand, Huawei maintains a firm stance that it is an entirely independent company without government intervention (Huawei Technologies Co., Ltd., 2023).

Huawei's Background & Development

In 1986, the Chinese government adopted a three-pronged policy to build a national telecommunications network: (1) direct import of equipment, (2) technological transfer and absorption, and (3) indigenous innovation with hopes that the Chinese firms would catch up with foreign multinational giants (Gallagher, p. 7, 2022). In 1987, Ren Zhengfei founded Huawei Technologies Co., Ltd., a private enterprise based in Shenzhen that designs, manufactures, and sells telecommunications network equipment and devices. This was a remarkable step in the policy's direction (Berman et al., 2023). Huawei's name is short for "China with achievements" in Mandarin Chinese, which appeals to Chinese nationalism (Tang, p. 4563, 2020). Initially, Huawei sold imported telephone switches from Western companies, including Alcatel, Ericsson, Nokia, Motorola, and Nortel. However, by 1990, Huawei began developing its own switches to differentiate itself from other telecom firms. In 1993, Huawei released the C&C08, China's most advanced digital switch at the time (Gallagher, p. 7, 2022).

In 1996, the Chinese Communist Party (CCP) and military began regarding Huawei as a "national champion," a status reserved for firms that bolster China's strategic aims (Berman et al., 2023). National champions received preferential policy treatment, access to low-cost financing, R&D funding, and tax benefits (Gallagher, p. 11, 2022). The Chinese government provided Huawei with significant government subsidies—up to \$75 billion since the company was founded (Berman et al., 2023). In 1998, the Chinese government established a "buy local" policy and offered domestic firms, including Huawei, access to low-cost loans for their customers. Research in 1998 indicated that the Beijing headquarters of China Construction Bank lent Huawei about \$600 million in buyer's credit, representing 45% of the total credit it extended that year. Chinese government financing allowed Huawei to offer affordable services to

customers and gain substantial domestic market share. Huawei's share of the Chinese switch market rose from around 20% in 1996 to 42% in 2004, which many scholars attribute to strong party support (Gallagher, p. 8, 2022).

With gains from the Chinese market, Huawei expanded its operations into Africa and Latin America. Established telecom giants, including Ericsson, Alcatel-Lucent, and Nokia, were reluctant to spare money and effort in building infrastructures for those "remote, turbulent regions with adverse natural conditions." Huawei saw this as an opportunity to obtain a foothold in the international market (Tang, p. 4563, 2020). Ren Zhengfei famously quoted China's first Chairman Mao Zedong to describe his business strategy as "surrounding the city from the countryside." Huawei leveraged low prices and excellent service to grow its customer base. (Luo, p. 72, 2019). Huawei has built 70% of Africa's 4G networks today (Hovanic, p. 363, 2022). Huawei also helped provide connectivity in rural regions of America, including Alabama, Colorado, and Oklahoma (Berman et al., 2023). By the end of 2001, Huawei had established offices in 45 countries, including the United States (Gallagher, p. 8, 2022). In 2002, Huawei launched FutureWei, the company's wholly-owned U.S. subsidiary, underscoring its long-term investment in global development (p. 11).

However, simply offering cheap equipment would not be sustainable in the highly competitive telecommunications industry. Huawei has consistently kept up with new technological trends. Over the past 20 years, Huawei has led a series of breakthroughs to improve its mobile sector. Notably, in July 2003, Huawei established its handset department. In February 2009, Huawei debuted its first Android smartphone and announced its cooperation with T-Mobile at the Mobile World Congress in Spain (Luo, p. 74, 2019). In the same year, Huawei began developing its 5G technology and invested \$600 billion into research and development

(R&D). It also established a 5G core research center in North America (Li & Li, p. 96, 2021). In August 2011, Huawei debuted its cloud service and introduced the world's first cloud-enabled smartphone, the Huawei Vision (Luo, p. 74, 2019). In 2012, Huawei surpassed Western telecommunication companies and became the world's largest equipment maker (Gallagher, p. 11, 2022).

In 2013, Chairman Xi Jinping announced the Belt and Road Initiative (BRI) as a national strategy to connect Asia with Africa and Europe via land and maritime networks to stimulate trade and economic growth. Huawei is uniquely situated to advance the BRI mission since its consumer products (like the telephone) connect people worldwide. Huawei has also branched into the transportation industry by supplying equipment for digital railways and smart airports (Hovanic, pp. 364-365, 2022). By 2014, Huawei had established multiple 5G innovation research centers in the United States, Germany, Japan, and other countries. Notably, Huawei engaged in Japan's 5G Mobile Communications Promotions Forum to formulate 5G development plans jointly and collaborate with multinational operators (Li & Li, p. 96, 2021).

In August 2019, Huawei first unveiled HarmonyOS, an independent Chinese operating system not subject to U.S. regulations. Huawei aims to make HarmonyOS the default operating system in China, replacing Android and iOS. It reported that over 700 million devices (including phones, smart devices, and computers) were equipped with HarmonyOS as of August 2023. Many provincial governments have also launched policies to support the wider adoption of HarmonyOS. For example, Shenzhen's government plans to eliminate "key bottleneck technologies" and "elevate HarmonyOS" to become on par with the world's leading operating systems by 2025. The plan's incentives include encouraging government entities to purchase HarmonyOS devices and rewarding successful use cases of the software (Xiang, 2023). Because

HarmonyOS is based on Linux, the same open-source platform as Android, companies could substitute Android with HarmonyOS easily (Brown, 2023).

By early 2020, Huawei successfully developed relatively inexpensive 5G phones for \$600 each. This price was almost half that of competing telecom companies, including Apple and Samsung (Tang, p. 4568, 2020). In 2021, Huawei's R&D expenditures ranked alongside Alphabet (Google's parent company) and Amazon at over \$22 billion. When measuring R&D as a percentage of sales, Huawei's expenditures were proportionally double. In 2022, Huawei reported \$91.5 billion in revenue and had three billion users of its products and services in over 170 countries (Berman et al., 2023). In September 2023, Huawei launched its latest 5G phone, the Mate 60 Pro, using advanced technology from China's Semiconductor Manufacturing International Corporation (SMIC) (Mukherjee, 2023).

Furthermore, in 2024, Huawei plans to build its first European mobile phone equipment factory in France. The company initially set to build the factory in 2020 but was delayed due to the Covid-19 pandemic. A French government source said the site expects to open in 2025 (Mukherjee, 2023). Huawei has achieved tremendous milestones in the telecommunications industry and continues to expand its global influence.

Debate (part 1): the Chinese government controls Huawei

The first part of debating Huawei's economic espionage investigates the CCP's influence over the company. Huawei's rapid breakthroughs in telecommunications have induced suspicions that the Chinese government plays a more prominent role in its operations than its leaders have disclosed. In 2012, the U.S. House of Representatives Permanent Select Committee on Intelligence released an initial report expressing concern about Huawei's ties to the Chinese government and military (Gallagher, p. 11, 2022).

Proposition

The Chinese government holds substantial power over the nation's private companies. Since China's economic reform in the 1980s, the CCP has affirmed its presence in the growing private sector, especially in foreign joint ventures. Foreign joint ventures are business partnerships between Chinese and foreign firms that coerce the latter to transfer intelligence in exchange for market access. The 1993 Company Law required both foreign and domestic companies based in China to allow the establishment of units to "carry out the activities of the CCP." Under Xi Jinping's authority, the line between the public and private spheres has blurred further. In 2012, the CCP's organization department called for the party to 'comprehensively cover' the private sector. This new wave of party-building efforts included sending 'party-building advisors' to private firms and creating party-building supervisory bodies. Since 2018, it has been mandatory for domestically listed companies to establish a CCP branch (Doyon, 2023).

Huawei officials are deeply intertwined with the CCP and the military. Notably, Huawei's founder, Ren Zhengfei, was an engineer in the People's Liberation Army during China's Cultural Revolution and is currently a party member. Ren's daughter and Huawei's Chief Financial Officer, Meng Wanzhou, reportedly held a passport typically issued only to

employees of the Chinese government or state-owned enterprises. U.S. officials believe Ren's connections to the CCP helped Huawei attain massive government support (Williams, p. 3, 2019).

Some experts point to vague Chinese laws that could force Huawei to help the CCP with intelligence gathering. In particular, the National Security Law, enacted in 2015, states that citizens and enterprises have the "responsibility and obligation to maintain national security." In addition, the 2017 National Intelligence Law required Chinese companies to "support, assist, and cooperate" with China's intelligence-gathering authorities (Berman et al., 2023). Such regulations alarmed U.S. officials, including Members of Congress, that Huawei is legally bound to provide confidential data to the Chinese government upon request (Gallagher, p. 15, 2022).

In addition, Huawei's internal structure is largely held secret, leading to speculations of government interference. Huawei has claimed that its employees fully own company stocks through an Employee Stock Ownership Program (ESOP). According to Huawei, there were almost 97,000 shareholding employees as of 2018. However, this stock is a contract right, not a property right. It gives the holder limited voting power in Huawei, cannot be transferred, and becomes canceled when the employee leaves the firm, subject to a redemption payment at a low fixed price (Balding et al., p. 5, 2019).

Shareholders also elect a Representatives' Commission comprising 115 members among them, which reviews and approves Huawei's finances (Huawei Technologies Co., Ltd., 2023b). However, the nomination process for the Representatives' Commission election contains a critical loophole. It is ambiguously stated that only "key employees, experts, and line managers who have worked at Huawei for many years" may nominate candidates. Nominees must fit similarly ill-defined criteria to run for the election. Key factors considered include employees'

“passion and commitment to work.” The fact that shareholders can only elect pre-screened candidates through a vague nomination process suggests that Huawei employees do not effectively control the company (Rühlig, p. 14, 2020). Rather, the lack of transparency opens leeway for political influence. Although Huawei claims that membership of the CCP “does not affect...the chances of becoming a Representative” or the results of any other election in the company, no mechanisms are in place to guarantee that leaders’ party obligations do not impede their work (p. 15).

Moreover, Huawei profited from major government subsidies. A *Wall Street Journal* report indicated that Huawei achieved its current position by receiving as much as \$75 billion in tax breaks, financing, and cheap resources in the past 25 years. According to the report, Huawei gained \$46 billion in cheap loans, credit lines, and other support from state lenders alone. From 2008 to 2018, the company saved \$25 billion in taxes due to state incentives to grow the tech sector. Moreover, the company benefited from Chinese banks providing cheaper loans to its customers. For instance, the China Development Bank and the Export-Import Bank of China reportedly lent \$30 billion to Huawei customers (Rühlig, p. 10, 2020).

Some U.S. analysts assert that government subsidies enabled Huawei to price its network equipment below foreign competitors’ rates. They argue that Huawei’s prices would not have even covered the cost of production without party assistance. Nevertheless, Huawei objects that its technological expertise enables it to offer such low prices (Berman et al., 2023). For instance, while Huawei claims to have used R&D investments to invent its first digital switch, Western researchers assert that it received considerable government funding. Allegedly, a group of Chinese government agencies transferred knowledge gained from joint ventures to Huawei, including data on advanced switches (Gallagher, p. 7, 2022). According to a July 2021 report by

the Center for Security and Emerging Technology (CSET) at Georgetown University, Huawei thrived in a business environment fostered by Beijing that normalized technology transfer from foreign firms (p. 9).

There is consensus that telecom equipment manufacturers would not voluntarily utilize their equipment for espionage. If caught doing so, their market shares would plummet, which is not a risk worth taking. However, Huawei may not be able to resist pressure from national authorities since 1) Huawei is a China-based company under its political regime, 2) Mainland China is Huawei's largest market by far, and 3) Huawei benefits from Chinese government subsidies (Lysne et al., p. 16, 2019).

Opposition

Huawei has distanced itself from the CCP, contending that its equipment has never been used, and will never be used, to spy. In May 2018, Huawei commissioned a report from a Chinese law firm, supporting its argument that it cannot be forced to spy. In 2019, Huawei's CEO Ren stated that he would never harm the interest of his customers and that Huawei would not answer government requests for intelligence (Berman et al., 2023). He claimed that since Huawei's founding in 1987, "not one of Huawei's customers has ever experienced a major cybersecurity breach" (Gallagher, p. 13, 2022). On its official website, Huawei makes its position clear that it is a private company entirely owned by employees. It states, "No government or any third party holds shares in our company, intervenes in our operations, or influences our decision-making" (Huawei Technologies Co., Ltd., 2023b). Although CCP organizations exist within Huawei, they are mainly responsible for educating employees. Huawei assures that an independent team manages its corporate operations (Rühlig, p. 9, 2020).

Huawei also addressed the controversy that Chinese law enables the CCP to force companies to collect intelligence on its behalf. Huawei claims that no Chinese law can require a telecommunications equipment manufacturer to harm its customer networks. It stated firmly: “If we are ever put in a position that jeopardizes our independence, the security of our products, or customer networks, we would sooner shut down the company than violate our principles” (Huawei Technologies Co., Ltd., 2023c).

Moreover, it should be noted that Western technology companies also receive funding from their governments, although their scope falls short of Huawei’s. For example, Finland’s Nokia and Sweden’s Ericsson benefit from their respective government’s export credits (Rühlig, pp. 10-11, 2020). China’s influence over Huawei may garner special attention from Western media due to China’s political and economic rivalry against the U.S.

Debate (part 2): Huawei stole U.S. intelligence

Proposition

The United States and several other countries have asserted that Huawei stole confidential data on behalf of the Chinese government, constituting economic espionage (Berman et al., 2023). Congress began receiving warnings about Huawei in 2012 when a U.S. House Permanent Select Committee on Intelligence report stated that Huawei's equipment could "undermine core U.S. national security interests." In 2018, six U.S. intelligence chiefs, including the directors of the CIA and FBI, cautioned Americans from using Huawei products, warning that the company could conduct "undetected espionage" (Berman et al., 2023).

Notably, U.S. technology companies Cisco Systems and T-Mobile accused Huawei of stealing trade secrets (Gallagher, p. 13, 2022). In 2003, Cisco sued Huawei by claiming that Cisco's source code appeared in Huawei products. The lawsuit was dismissed after a third party reviewed Huawei's products, and Huawei discontinued the sale of products at issue in the suit (Berman et al., 2023). The case between T-Mobile and Huawei is more extensive. The U.S. Department of Justice claimed that between June 2012 and September 2014, Huawei repeatedly attempted to steal information about the design of a T-Mobile robot named Tappy. Allegedly, one of Huawei USA's engineers, referred to as A.X., removed Tappy's arm and hid it in his personal bag. A.X. and another engineer from China, F.W., discreetly measured and photographed the arm. They then sent the unauthorized photos to Huawei China. When A.X. and F.W. were caught, Huawei China told T-Mobile that internal investigations in the U.S. and China "confirmed" that the employees had independently violated company regulations and were both terminated for cause (Wamsley, 2019). However, in 2014, T-Mobile filed a civil lawsuit against Huawei. Prosecutors argued that Huawei had launched an internal incentive program rewarding

employees “who stole confidential info from competitors.” The incentive was arguably a critical factor that motivated A.X. to steal Tappy (Hovanic, p. 366, 2022). Nevertheless, the Seattle jury found no “willful and malicious” misappropriation in Huawei’s conduct and did not award any damages for theft of trade secrets. Ultimately, Huawei paid T-Mobile \$4.8 million for breaching a Handset Accessory Supply Agreement (Zhang, p. 208, 2019).

Furthermore, in February 2020, the U.S. Department of Justice charged Huawei with racketeering conspiracy to steal trade secrets. According to the indictment, the violations allowed Huawei to “drastically cut its research and development costs and associated delays, giving the company a major unfair competitive advantage” (Berman et al., 2023).

There are also concerns that Huawei’s 5G infrastructure contains backdoors that allow the Chinese government to collect and centralize massive quantities of data to attack American communications networks. In 2022, an FBI investigation found that Huawei equipment could disrupt U.S. military communications (Berman et al., 2023). Some security experts caution that the CCP could exploit a hidden vulnerability and steal U.S. national security information, personal information, or intellectual property from American businesses (Gallagher, p. 10, 2022).

Opposition

On the other hand, some experts maintain that the U.S. should not label Huawei as a spy without definitive proof. The United States has not publicly provided any evidence that Huawei is guilty of economic espionage (Berman et al., 2023). “Punitive legal action based on suspicion does not stand well with the U.S. democratic honorable justice system” (Williams, 2019). Shuang Geng, the Chinese Ministry of Foreign Affairs spokesman, also stated: “A country has the right to safeguard its information security. But it cannot, under the pretext of security, harm

or even stifle the legitimate operation of enterprises.” He conveyed that U.S. crackdowns have unjustifiably impacted Huawei’s operations. America’s hostility against Huawei without criminal evidence has prompted some countries to “question whether America’s campaign is really about national security, or if it aims to prevent China from gaining a competitive edge” (Zhang, p. 209, 2019). Additionally, some critics point out that Western media often understates the intimate relationship between telecom giants and military branches in their home states, illustrating media imperialism (Tang, p. 4563, 2020).

Moreover, for the Tappy case, Huawei claims that T-Mobile published a video of Tappy on YouTube, including its schematics, in September 2012. The video showed that Tappy is a modified Epson SCARA robot, data on which was readily available and not considered a trade secret. William Wevers, a third-party expert who examined Tappy in 2012, also testified that “Tappy was not all that valuable or beneficial since it did not work well” (Zhang, p. 209, 2019). Even if the Tappy technology was effective, Huawei never incorporated it into its own robot, the xDR. This is why the jury did not penalize Huawei for trade-secret misappropriation. Huawei continues to deny violating any U.S. law (p. 210).

U.S. imposed restrictions on Huawei

With the U.S. and China unwilling to budge on opposing sides of the debate, their conflict has only increasingly intensified. The U.S. government is highly concerned about the CCP's power over Huawei and its threat to national security. Given the uncertainty of espionage, federal officials believe it would be reckless to only react to what has already happened without weighing the severity of the risks (Rühlig, p. 7, 2020). As a result, Huawei has faced several setbacks in the American market.

Restrictions on federal use of Huawei equipment

The U.S. government began placing restrictions on Huawei in December 2017 by prohibiting certain Department of Defense (DoD) networks from using Huawei equipment (Berman et al., 2023). In April 2018, the DoD banned additional sales of Huawei devices at military exchanges due to concerns from military officials that the Chinese government could use the devices to track the movement and location of soldiers. Furthermore, Section 899 of the John S. McCain National Defense Authorization Act (NDAA) in 2019 “prohibits the purchase of covered telecommunications equipment and services from vendors who sell products containing spyware.” Under this policy, federal agencies cannot contract with Huawei or other companies using Huawei equipment. Nonetheless, Section 899 allowed entities to obtain a one-time waiver on a case-by-case basis for up to two years (Gallagher, p. 16, 2022).

Restrictions on private use of Huawei equipment

In May 2019, the Trump Administration signed Executive Order 13873, Securing the Information and Communications Technology (ICT) Services Supply Chain, prohibiting the purchase or use of any ICT produced by “foreign adversaries” posing “an unacceptable risk to

the national security of the United States.” Though the Executive Order did not name any specific company, it was widely perceived in the intelligence community to target Huawei (Schneider-Petsinger, p. 9, 2019).

In November 2019, the Federal Communications Commission (FCC) prohibited using the Universal Service Fund (USF) to purchase equipment and services from companies threatening national security, including Huawei. The USF supports small and rural network operators, who constituted Huawei’s primary U.S. customer base (Gallagher, p. 23, 2022). In September 2020, the FCC’s extensive data survey of operators determined replacement costs to be approximately \$1.8 billion. Thus, in December 2020, through the Consolidated Appropriations Act, Congress appropriated \$1.9 billion to the FCC to remove Huawei equipment from existing U.S. networks. American carriers with 10 million or fewer customers were eligible for reimbursement of costs related to the removal and replacement of Huawei equipment. The FCC accepted applications for reimbursement between October 2021 and January 2022 (pp. 23-24).

The Biden Administration has maintained a consistent stance to restrict imports from Huawei due to cybersecurity concerns. In November 2021, President Biden passed a bill requiring the FCC not to authorize specific “covered” equipment in the United States, including Huawei (Gallagher, p. 2, 2022). A year later, In November 2022, the FCC adopted new laws prohibiting the sale of some Huawei communications equipment in the U.S., citing “unacceptable” safety risks (Berman et al., 2023).

Restrictions on export of U.S. technology to Huawei

In May 2019, the Bureau of Industry and Security (BIS) under the U.S. Department of Commerce (DoC) added Huawei and 68 non-U.S. affiliates to the Entity List, which limited trade with foreign entities engaged in activities contrary to national policy interests. This

required American companies to obtain a Temporary General License (TGL) if they wished to export to Huawei. The TGL allowed U.S. software providers that previously supported Huawei to send software patches to ensure network security. It also gave American companies some time to adjust their business strategy. The TGL was initially valid for 90 days but was extended several times from May 2019 to August 2020 (Gallagher, p. 25, 2022).

Upon the BIS' announcement of the Entity List, Google restricted Huawei's access to its products, including its Android operating system. Consequently, Huawei began vigorously developing its independent HarmonyOS operating system. Shortly after Google's decision, several U.S.-based companies, including Qualcomm, Intel, ARM, and Microsoft, followed suit. Huawei's flagship smartphone was limited to 4G capability until it released its own 5G device in September 2023 (Brown, 2023).

Moreover, in May 2020, the DoC issued new rules to block foreign semiconductor manufacturers that use U.S. machines and software from shipping products to Huawei without a license. Notably, the Taiwan Semiconductor Manufacturing Company (TSMC), which had supplied over 90% of Huawei's smartphone chips, halted business with Huawei in 2020 due to U.S. intervention (Berman et al., 2023).

Additionally, in August 2020, the BIS added 38 Huawei affiliates to the Entity List and tightened export restrictions. The new rules closed loopholes that Huawei was using to obtain advanced chipsets, such as leveraging overseas foundries that use U.S. technology to develop its advanced chips and shipping them directly to the end-user. The BIS adopted a "presumption of denial" policy, meaning it was unlikely to approve license requests. However, the BIS was more likely to approve transactions for inferior (e.g., 3G, 4G) technologies (Gallagher, p. 25, 2022).

Ultimately, in January 2023, the Biden administration stopped providing licenses for U.S. companies to export goods to Huawei completely. President Biden also took extensive measures beyond Huawei, signing legislation that prevents any Chinese manufacturer from obtaining chips or equipment made with U.S. chips (Berman et al., 2023).

Pressuring U.S. allies to restrict trade with Huawei

The Trump Administration has initiated a global campaign to pressure its foreign allies to halt imports from Huawei. American officials have warned friendly countries, including Germany, Italy, and Japan, about Huawei's cybersecurity risks. They also promised to increase funding for the technological development of countries that cut ties with Huawei (Woo & O'Keeffe, 2018). In particular, Mike Pompeo, the former secretary of state, pledged to withhold intelligence from nations that use Chinese telecom equipment. The American ambassador to Germany also cautioned Berlin that the U.S. would curtail intelligence sharing if it continued purchasing from Huawei (Barnes & Satariano, 2019).

The Biden Administration has largely maintained former President Trump's position to strengthen international partnerships to combat Huawei's cybersecurity threat. In a Spring 2020 *Foreign Affairs* article, he wrote that the best way to confront China is by forming a "united front" with allies. Biden's top foreign policy adviser, Tony Blinken, advocated working with foreign allies to set common policies on export controls, investment regulations, and technical standards to ensure an "ecosystem that protects and promotes liberal democratic values" (Whalen, 2020).

Continued trade between the U.S. and Huawei

Despite heavy regulations, the DoC has allowed some exports of U.S. equipment to Huawei that would not induce substantial safety risks (Berman et al., 2023). For instance, in August 2021, the DoC permitted exports of chips to Huawei for in-vehicle technologies, such as video screens and sensors. The reasoning followed that those chips were less sophisticated than 5G-capable chips and thus did not threaten national security interests (Gallagher, p. 6, 2022).

In October 2021, the House Foreign Affairs Committee requested and published licensing information from the DoC. Reportedly, from November 9, 2020, to April 20, 2021, American companies submitted 169 license requests to sell products to Huawei. The DoC approved 113 licenses worth \$61 billion, returned 48 licenses worth \$28 million without further action, and denied two licenses worth \$57 million (Gallagher, p. 32, 2022). This system allowed Qualcomm, Sony, and Samsung to sell certain smartphone manufacturing parts to Huawei (Brown, 2023). The documents revealed that both the Trump and Biden Administrations approved sales of U.S. products to Huawei, which some Members of Congress critiqued to be contrary to U.S. national security and foreign policy objectives. Congress has pressed for greater transparency in the license criteria and approval process (Gallagher, p. 32, 2022).

Huawei's failed attempts to lift U.S. restrictions

In an open letter to the U.S. government in 2011, Huawei called for fair treatment and a full investigation to clear its name. In response, the House Permanent Select Committee on Intelligence started an investigation in 2011, which led to a hearing and a final report in 2012. However, the report concluded that Chinese telecommunication companies pose cybersecurity concerns and urged the U.S. government to “remain vigilant” (Tang, p. 4563, 2020).

Moreover, shortly after the announcement of Section 889, Huawei challenged its constitutionality at the U.S. District Court on March 7, 2019. It argued that the legislation punished Huawei without due process of a judicial trial. However, in February 2020, the federal court rejected Huawei's contention after a thorough investigation of its national security threat. Then, on July 30, 2020, Huawei petitioned the FCC to reconsider its ban on using USF funds for Huawei equipment and services. Nevertheless, in December 2020, the FCC chose to uphold its initial decision (Gallagher, p. 22, 2022).

Following, on February 8, 2021, Huawei filed a petition in the U.S. Court of Appeals for the Fifth Circuit, which challenged the FCC's authority to ban Huawei. Huawei argued that in its cost-benefit analysis, the FCC ignored the benefits of its services to rural American communities. Huawei claimed that excluding its equipment from U.S. networks could adversely affect service in rural regions where it is often the sole supplier and cause some carriers to go out of business, widening the digital divide. However, in June 2021, the federal court denied Huawei's petition for review, concluding that “the [FCC] reasonably acted within the broad authority Congress gave it to regulate communications” (Gallagher, p. 25, 2022).

Repercussions of U.S. restrictions on Huawei

Effects on Huawei

Before U.S. exports were discontinued in 2019, Huawei said it relied on U.S. software, microchips, specialty lasers, and other products for one-third of its supply chain. When TSMC also halted exports to Huawei in 2020, citing U.S. intervention, Huawei had to halt production of 5G products completely. Although Huawei accumulated a limited supply of semiconductors before the ban took effect, it allegedly ran out in late 2022. The shortage damaged Huawei's profit drastically: In 2021, the company reported approximately \$90 billion (636.8 billion yuan) in revenue, a 23% drop from 2019 (Berman et al., 2023).

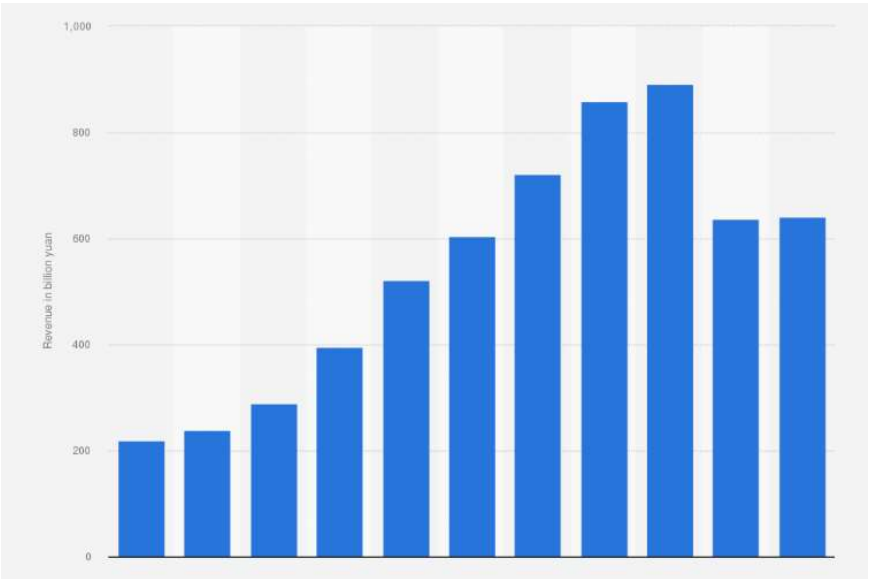
Foreign bans have forced Huawei to diversify its business lines, expanding into cloud services, Internet of Things (IoT), smartphone operating systems, and enterprise business. Huawei also embarked on a hiring spree within its chipmaking unit, bringing dozens of highly trained engineers on board to help develop semiconductor-design software (Hernandez, 2022). Simultaneously, Huawei invested heavily in R&D, starting a semiconductor investment fund in 2019. Huawei executives acknowledged the challenges of navigating the geopolitical conflict but maintained a confident attitude. Eric Xu, the rotating chairman of Huawei, commented: "China's semiconductor industry will not sit idly by, but will take efforts around self-saving, self-strengthening and self-reliance" (Che, 2023).

In 2022, Huawei's net revenue rose by merely 0.9%, and blamed its stagnancy on escalating U.S. sanctions and pandemic lockdowns (Che, 2023). Nevertheless, Huawei seems to be on a successful track to recovery. In September 2023, Huawei surprised the world by launching its newest 5G phone, the Mate 60 Pro. The tech industry was shocked by how fast Huawei mass-produced advanced 5G chips in a strictly sanctioned environment. This marked a

significant milestone in Huawei’s capabilities and a blow to U.S. efforts to stunt its growth (Mukherjee, 2023). The new device has been “eagerly embraced by consumers and has allowed Huawei to snatch market share away from Apple (APPL) in China.” Huawei is predicted to amass over \$99 billion (700 billion yuan) in revenue in 2023, a 9% jump from 2022. This number is, however, still below the \$120 billion recorded in 2019. In the 2023 year-end message to employees, Huawei’s rotating chairman, Ken Hu, exclaimed: “After years of hard work, we’ve managed to weather the storm. And now we’re pretty much back on track” (Toh, 2023).

Figure 1

Huawei’s revenue from 2012 to 2022 (in billion yuan)



(Slotta, 2023)

Effects on American businesses

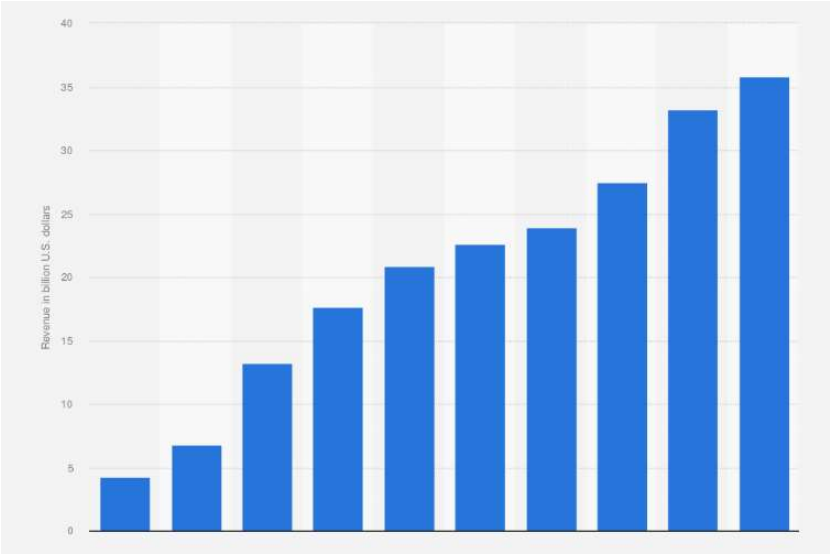
Restrictions on exports to Huawei reduced revenues for some American businesses, which analysts worried could decrease R&D investments and diminish the competitiveness of U.S. firms. In 2018, before the ban, Huawei reportedly purchased \$70 billion in parts from 13,000 global suppliers, including about \$11 billion from American businesses, such as

semiconductors from Qualcomm and Broadcom and software from Microsoft and Google. In September 2019, Broadcom projected a \$2 billion reduction in revenue due to export regulations. Its CEO noted in a quarterly earnings call that it expects to “operate in a very low growth uncertain macro environment for the foreseeable future” (Gallagher, p. 29, 2022).

Broadcom’s revenue growth rate slowed from 18.21% in 2018 to 8.39% in 2019 to 5.71% in 2020. Nevertheless, in September 2021, the CEO of Broadcom stated that its revenue was up 16.44% from the previous year, which he attributed to higher demand from global network operators and strategic investments in software and cloud services. Gains in other areas helped offset the bans on semiconductor exports to Huawei (Gallagher, p. 33, 2022). Figure 2 indicates that although the growth rate of Broadcom’s revenue has decreased from 2018 to 2020, the amount of revenue has still increased annually.

Figure 2

Broadcom’s revenue worldwide from 2014 to 2023 (in billion U.S. dollars)



(Alsop, 2024)

Moreover, small carriers directed to “rip and replace” Huawei equipment from their networks expressed concern about how this may disrupt service, including 911, in rural areas.

The president and chief executive officer (CEO) of the Competitive Carriers Association, who represents many smaller and regional carriers, stated: “Directives are being issued with no idea of the complexity. In some cases, our members must replace everything from antennas and remote radio heads (RRHs) down to baseband units (BBUs) and the core without interrupting service.” Some operators raised concerns over eligible costs that were not fully covered, workforce shortages that may delay the installment of new equipment, and the one-year timeline for implementation (Gallagher, pp. 24-25, 2022).

On July 1, 2019, Bloomberg reported that the Semiconductor Industry Association (SIA) met with the Commerce and Treasury Secretaries to communicate that the Huawei ban hurt the U.S. semiconductor industry by restricting access to their largest market. The federal government acknowledged their concerns and loosened some export restrictions. During a press conference after the G-20 summit in Japan in July 2019, President Trump discussed that American businesses were “not exactly happy” with the rigid regulations and announced that he would approve certain exports to Huawei (Gallagher, p. 30, 2022).

On the other hand, some Members of Congress opposed that lifting the restrictions, as President Trump planned, would cause national security issues. In a letter to President Trump dated November 21, 2019, a group of ten lawmakers urged him to suspend the approval of export licenses. They also informed his Administration about the dangerous implications of continuing trade with Huawei (Gallagher, p. 31, 2022). A key challenge for the U.S. government lies in balancing the conflicting interests of different stakeholders.

Effects on foreign countries

Members of the Five Eyes intelligence alliance, comprising the United States, Australia, Canada, New Zealand, and the United Kingdom, have banned or are proceeding with bans on

Huawei. Other U.S. partners, including Belgium, Denmark, Estonia, France, Lithuania, Poland, Romania, and Sweden, have also restricted the use of Huawei equipment (Berman et al., 2023).

Nevertheless, many low-income countries have contracted with Huawei to build their 5G networks since it is frequently the most cost-efficient option. They argue that security risks are inherent in all 5G networks, albeit they may be higher for Huawei (Berman et al., 2023). For example, Bahrain, a small Middle Eastern country that headquarters the U.S. Navy's Fifth Fleet, used Huawei technology to construct its 5G network in June 2019. The U.S. is especially wary of Chinese telecom equipment in countries that host American military bases since most traffic at military installations travels through commercial networks (Woo & O'Keeffe, 2018). Kenya's largest telecom operator, Safaricom, also worked with Huawei to launch their 5G network in October 2022 (Panettieri, 2023). Additionally, Thailand partners with Huawei to provide 5G technologies across rural hospitals (Huawei Technologies Co., Ltd., 2023a).

Moreover, countries in the European Union have adopted various measures to manage Huawei's security risks. However, they are resisting pressure from Washington to impose an outright ban. For example, France and the United Kingdom reduced the use of Huawei equipment to non-critical parts of the network. Germany and Poland raised security standards across the entire 5G network, not only limited to Huawei (Lysne et al., p. 6, 2019). Notably, Europe's largest telecom company, Deutsche Telekom based in Germany, said that if Huawei gets banned, it will delay the 5G rollout in Europe by up to two years. To avoid such setbacks, they proposed a new security certification process for mobile network equipment that would allow Germany to continue using Chinese vendors (Panettieri, 2023). A Global System for Mobile Communications Association report estimated that 5G deployment would cost Europe an additional \$62 billion if they did not buy from Huawei (Lysne et al., p. 23, 2019).

In general, European officials advocate for increasing vendor diversity to reduce network security risks. An outright ban on Huawei would contradict that objective. Instead, experts believe Europe should reduce Huawei's market share by utilizing a greater variety of vendors since its technological dependency on Huawei is very high. Their goal is to avoid over-reliance on any foreign actor, whether China or the U.S. (Rühlig, p. 19, 2020).

Further action the U.S. should take against Huawei

Invest in research and development

Experts believe that a critical reason why the U.S. has yet to achieve more success in persuading other countries to stop purchasing from Huawei is that it cannot offer a better alternative. David Sacks from the Council on Foreign Relations wrote, “The United States does not and will not have a company that is competitive in the full stack of 5G equipment.” According to the Biden-Harris Administration’s 2022 National Security Strategy, it is imperative to enhance 5G and other advanced telecommunications technologies (The White House, p. 34, 2022).

Previously, the Transatlantic Telecommunications Security Act (H.R. 3344) was introduced to authorize the U.S. International Development Finance Corporation (DFC) to fund the development of 5G networks for allies in Central and Eastern Europe that do not contract with dangerous suppliers like Huawei (Gallagher, p. 43, 2022). However, this bill was not enacted, as it was passed by the House but not by the Senate. Its provisions could be re-assessed in subsequent sessions of Congress for inclusion in a new bill (Civic Impulse, LLC, 2023). Such federal investments should also extend beyond wealthy countries. As per the National Security Strategy, “We must also focus on providing high-quality digital infrastructure in low- and middle-income countries, bridging digital divides by emphasizing access among marginalized groups” (The White House, p. 33, 2022).

Furthermore, the U.S. should spearhead the development of 6G technology, which is projected to replace 5G within the next fifteen years (Berman et al., 2023). On August 9, 2022, the Biden Administration enacted the CHIPS and Science Act, which provided \$52.7 billion for American semiconductor research, development, manufacturing, and workforce development.

This funding included \$39 billion for manufacturing on American soil, \$13.2 billion for R&D and workforce training, and \$500 million for supporting international information communications technology activities (The White House, 2022). Expanding on such efforts will help strengthen American supply chains and progress technologically.

Listen to stakeholders' opinions

Diverse perspectives from stakeholders, including contractors, grantees, overseas vendors, small businesses, and universities, could better inform the U.S. government on navigating its complex relationship with Huawei. Understanding the scope of Huawei's influence is vital to compete against it. Congress should hold oversight hearings with various stakeholders to discuss progress and setbacks in the telecommunications and cybersecurity fields. In addition, Congress could utilize Section 889 reports to understand the nature of U.S. services to Huawei and to inform future foreign policies. Section 889 requires entities seeking an export waiver to provide a complete description of the presence of the covered equipment in its network and a phase-out plan (Gallagher, p. 35, 2022).

Moreover, the U.S. should not overstate Huawei's economic espionage allegations. For example, the verdict of the T-Mobile case was that Huawei employees attempted to steal a U.S. robot. This wrongdoing should not be conflated with spying on behalf of the CCP. The U.S. government also frames China as the only significant culprit of IP theft. Allegations of IP infringement against other countries have not been investigated and punished under the same standard of rigor. The U.S. must explain how China's practices differ from other countries in threatening national security (Williams, p. 5, 2019).

Strengthen global cybersecurity agreements

Although removing Huawei equipment from U.S. networks may mitigate some risks, other concerns persist and continue to arise. Due to the interconnected nature of the digital sphere, a breach of one network could affect all others (Gallagher, p. 35, 2022). Thus, the U.S. should advance international coalitions to tighten cybersecurity requirements. Global coordination on 5G security began under the Trump Administration through efforts including the Prague Proposals, where 22 nations agreed on security recommendations and the State Department's Clean Networks initiative. The Biden Administration also engages its allies in cybersecurity education and shares solutions to block untrusted vendors, including Huawei (p. 39).

Notably, in December 2021, the U.S. hosted the first Summit for Democracy with representatives from a hundred countries and discussed ways to counter digital authoritarianism. Following, in March 2023, the U.S. co-hosted the second Summit for Democracy with the governments of Costa Rica, the Netherlands, the Republic of Korea, and the Republic of Zambia to promote internet freedom and security. During the Summit, President Biden joined an initial group of nine countries in endorsing the Joint Statement on Efforts to Counter the Proliferation and Misuse of Commercial Spyware. The initial group of partners included Australia, Canada, Costa Rica, Denmark, France, New Zealand, Norway, Sweden, Switzerland, and the United Kingdom (The White House, 2023). Countries should meet consistently to hold each other accountable for achieving policy goals.

Establish international procedures to address economic espionage

It may come as a surprise that no law explicitly prevents nations from spying on each other. Among existing regulations, IP law covers the legal protection of a company's intangible assets

and may apply to espionage crimes. The two leading international organizations that maintain and enforce IP rights are the United Nations (UN) and the World Trade Organization (WTO) (Hovanic, pp. 368-369, 2022).

Administered by the UN's World Intellectual Property Organization (WIPO), the Paris Convention for the Protection of Industrial Property was adopted in 1883 to prevent unfair competition and promote IP rights. Under Article 10bis of the Paris Convention, countries are "bound to assure to nationals of such countries effective protection against unfair competition," defined as "any act of competition contrary to honest practice in industrial and commercial matters." Dr. Russell Buchan of the University of Sheffield believes Article 10bis could counter the growing threat of economic espionage. However, the Paris Convention has never been enforced in such a manner (Hovanic, p. 370, 2022).

The International Court of Justice (ICJ) is in authority to apply Article 10bis of the Paris Convention to criminalize economic espionage. However, the ICJ must overcome several hurdles before it can bring suit against Huawei. Firstly, Article 34, Section 1 of the ICJ Statute declares that "only states may be parties in cases before the Court." On the contrary, Huawei is a private company claiming to be "wholly owned by its employees." Secondly, no standard dictates how much evidence is sufficient to prove the state's role in a private party. Therefore, without a criterion for state involvement and evidence demonstrating state interference, Huawei cannot be tried before the ICJ. It is imperative for the UN to develop a standard of liability for economic espionage by state-sponsored private actors (Hovanic, p. 373, 2022).

In addition, the WTO established the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) to set guidelines on how IP, including copyrights, patents, trademarks, and trade secrets, ought to be protected when trade is involved (Hovanic, p. 372, 2022).

However, TRIPS requires home nations to maintain criminal procedures for “willful trademark counterfeiting or copyright piracy on a commercial scale.” China has never charged Huawei with violating any IP law, and logic suggests a nation is unlikely to prosecute a state-sponsored company (Hovanic, p. 376, 2022). It will be critical for an international coalition to impose strict punishment for economic espionage in order to discourage the act. Without a remedy rooted in international law, we cannot compensate victim nations. Without proper punishment, perpetrators are undeterred from repeating their crimes (p. 378).

Conclusion

While the precise nature of the relationship between Huawei and China is practically impossible to understand as an outsider, public information reveals that the Chinese government is interested in the affairs of Huawei, may provide financial resources, and may direct Huawei to share confidential data on consumer networks (Hovanic, p. 372, 2022). Huawei likely leveraged both technological expertise and state assistance to thrive in a highly competitive global telecommunications industry.

There are two main reasons why the U.S. government is concerned about Huawei's expansion. One is a national security concern that the Chinese government could use Huawei's position in the 5G network to commit economic espionage. The other is a geopolitical concern that a Chinese company could dominate a sector of America's strategic interest (Lysne et al., p. 15, 2019).

Although the U.S. has not provided explicit evidence of Huawei spying for the CCP, there is bipartisan support in Congress to restrict trade with Huawei. Federal officials broadly agree that Huawei's motivations conflict with U.S. national security and foreign policy goals (Gallagher, p. 28, 2022). Thus, the U.S. government has taken measures to remove Huawei from its networks and restrict sales of critical resources for 5G development to Huawei. Congress should continue to monitor the implementation of its policies against Huawei to mitigate unintended impacts on U.S. federal agencies and businesses. The policies must carefully balance U.S. political and economic interests (p. 40).

Simultaneously, the U.S. must invest heavily in R&D to elevate its technological competitiveness. The most foolproof method to get other countries to contract with American vendors instead of Huawei would be offering a cost-effective alternative that is both affordable

and high-quality. The nation that develops 6G standards and equipment will presumably lead the future of technology and the global economy (Gallagher, p. 39, 2022).

As President Biden declared: “We stand now at the inflection point, where the choices we make and the priorities we pursue today will set us on a course that determines our competitive position long into the future” (The White House, p. 24, 2022). The controversy over Huawei’s economic espionage is more pressing to investigate than ever before. The U.S. government and its people must act decisively to promote cybersecurity and ensure a fair technology competition against China.

Bibliography

- Alsop, T. (2024, January 4). *Broadcom's revenue worldwide from 2014 to 2023 (in billion U.S. dollars)* [Graph]. Statista. <https://www.statista.com/statistics/977066/broadcom-revenue/>
- Balding, C., & Clarke, D. C. (2019). Who Owns Huawei?, 1-15. <http://dx.doi.org/10.2139/ssrn.3372669>
- Barnes, J., & Satariano, A. (2019, March 17). U.S. Campaign to Ban Huawei Overseas Stumbles as Allies Resist. *The New York Times*. <https://www.nytimes.com/2019/03/17/us/politics/huawei-ban.html#:~:text=WASHINGTON%20%E2%80%94%20The%20Trump%20administration%27s%20aggressive,the%20companies%20pose%20a%20security>
- Berman, N., Maizland, L., & Chatzky, A. (2023, February 8). *Is China's Huawei a Threat to U.S. National Security?* Council on Foreign Relations. <https://www.cfr.org/backgrounder/chinas-huawei-threat-us-national-security>
- Brown, C. S. (2023, December 7). *The HUAWEI ban explained: A complete timeline and everything you need to know*. Android Authority. <https://www.androidauthority.com/huawei-google-android-ban-988382/>
- Che, C. (2023, March 31). Huawei, Pummeled by U.S. Sanctions, Reports Plunge in Profit. *The New York Times*. <https://www.nytimes.com/2023/03/31/business/huawei-annual-earnings-2022.html#:~:text=The%20Chinese%20telecommunications%20giant%20Huawei,prices%20and%20lingering%20pandemic%20restrictions>
- Civic Impulse, LLC. (2023). *GovTrack*. H.R. 3344 (117th): Transatlantic Telecommunications Security Act. <https://www.govtrack.us/congress/bills/117/hr3344>
- Doyon, J. (2023). CCP branches out into private businesses. *The East Asia Forum*. <https://doi.org/10.59425/eabc.1691748055>
- Gallagher, J. C. (2022). U.S. Restrictions on Huawei Technologies: National Security, Foreign Policy, and Economic Interests (R47012). *Congressional Research Service*, 1-40. <https://crsreports.congress.gov/product/details?prodcode=R47012>
- Hernandez, V. (2022, September 7). HAVE THE HUAWEI BANS ACHIEVED THE US' INTENDED GOALS? *International Banker*. <https://internationalbanker.com/technology/have-the-huawei-bans-achieved-the-us-intended-goals/>
- Hovanic, Anya. (2022). Let's keep this between you, me, and my cell phone: Huawei, espionage, & international law. *North Carolina Journal of International Law*, 48(2), 359-378. <https://heinonline.org/HOL/P?h=hein.journals/ncjint48&i=373>

- Huawei Technologies Co., Ltd. (2018, February 26). *Huawei Launches Full Range of 5G End-to-End Product Solutions*. <https://www.huawei.com/en/news/2018/2/huawei-launches-full-range-of-5g-end-to-end-product-solutions>
- Huawei Technologies Co., Ltd. (2023a). *5G Extends the Reach of Smart Healthcare in Thailand*. <https://www.huawei.com/en/tech4all/stories/thailand-5g-telemedicine>
- Huawei Technologies Co., Ltd. (2023b). *Shareholders & Representatives*. <https://www.huawei.com/en/corporate-governance/the-shareholders-meeting-and-the-representatives-commission#:~:text=The%20Commission%20consists%20of%20no,of%20regular%20and%20alternate%20members>
- Huawei Technologies Co., Ltd. (2023c). *We Are an Independent Company*. <https://www.huawei.com/en/trust-center/trustworthy/we-are#:~:text=Huawei%20is%20a%20private%20company,or%20influences%20our%20decision%2Dmaking>
- Keith, E. (2022, February 24). *5G tracker: 79 markets worldwide have commercial services*. S&P Global Market Intelligence. <https://www.spglobal.com/marketintelligence/en/news-insights/research/5g-tracker-79-markets-worldwide-have-commercial-services#:~:text=%20Ericsson%20claimed%20170%20commercial%205G,reach%20100%205G%20live%20networks>
- Li, Y., & Li, T. Z. (2021). Construction of Enterprise 5G Business Ecosystem: Case Study of Huawei. *American Journal of Industrial and Business Management*, 11, 92-110. <https://doi.org/10.4236/ajibm.2021.1111007>
- Low, B. (2007), "Huawei Technologies Corporation: from local dominance to global challenge?", *Journal of Business & Industrial Marketing*, 22(2), 138-144. <https://doi.org/10.1108/08858620710730258>
- Luo, C. (2019). The Real Huawei Story and the 5G Era. *The Park Place Economist*, 27(1), 72-78. <https://digitalcommons.iwu.edu/parkplace/vol27/iss1/18>
- Lysne, O., Elmokashfi, A., Schia, N. N., Gjesvik, L., & Friis, K. (2019). Critical Communication Infrastructures and Huawei. *TPRC47: The 47th Research Conference on Communication, Information and Internet Policy*, 1-38. <http://dx.doi.org/10.2139/ssrn.3426222>
- Mukherjee, S. (2023, December 11). *Huawei to start building first European factory in France next year*. Reuters. <https://www.reuters.com/technology/huawei-start-building-first-european-factory-france-next-year-source-2023-12-11/>
- Panettieri, J. (2023, April 27). *Huawei: Banned and Permitted In Which Countries? List and*

- FAQ. ChannelE2E and CyberRisk Alliance. <https://www.channele2e.com/news/huawei-banned-in-which-countries>
- Reuters. (2023, September 1). *Has Huawei overcome U.S. sanctions by developing its own 5G chip?* <https://www.reuters.com/technology/why-is-huaweis-new-smartphone-generating-so-much-buzz-2023-09-01/>
- Rühlig, T. (2020). Who Controls Huawei? Implications for Europe. *The Swedish Institute of International Affairs*, 4-23. <https://www.ui.se/globalassets/butiken/ui-paper/2020/ui-paper-no.-5-2020.pdf>
- Schneider-Petsinger, M., Wang, J., Jie, Y., & Crabtree, J. (2019). US–China Strategic Competition: The Quest for Global Technological Leadership. *The Royal Institute of International Affairs*, 1-43. <https://www.chathamhouse.org/2019/11/us-china-strategic-competition>
- Slotta, D. (2023, June 1). *Revenue of Huawei from 2012 to 2022 (in billion yuan)* [Graph]. Statista. <https://www.statista.com/statistics/233071/revenue-of-huawei/>
- Tang, M. (2020). Huawei Versus the United States? The Geopolitics of Extraterritorial Internet Infrastructure. *International Journal Of Communication*, 14(22), 4556-4577 <https://ijoc.org/index.php/ijoc/article/view/12624>
- The White House. (2022a, August 9). *FACT SHEET: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China*. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/>
- The White House. (2023, March 29). *FACT SHEET: Advancing Technology for Democracy*. <https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/29/fact-sheet-advancing-technology-for-democracy-at-home-and-abroad/>
- The White House. (2022b, October). *National Security Strategy*. <https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>
- Toh, M. (2023, December 29). Huawei was once fighting for its survival. It is back to nearly \$100 billion in revenue in 2023. CNN Business. <https://www.cnn.com/2023/12/29/tech/huawei-revenue-rebound-china-intl-hnk/index.html#:~:text=The%20Shenzhen%2Dbased%20conglomerate%20said,performance%20in%20its%20electronics%20business>
- Whalen, J. (2020, November 16). Biden likely to remain tough on Chinese tech like Huawei, but with more help from allies. *The Washington Post*. <https://www.washingtonpost.com/technology/2020/11/16/biden-huawei-trump-china/>

- Williams, R. (2019, January 30). *Is Huawei a Pawn in the Trade War?* Council on Foreign Relations. <https://www.foreignaffairs.com/articles/china/2019-01-30/huawei-pawn-trade-war>
- Woo, S., & O’Keeffe, K. (2018, November 23). Washington Asks Allies to Drop Huawei. *The Wall Street Journal*. <https://www.wsj.com/articles/washington-asks-allies-to-drop-huawei-1542965105>
- Xiang, N. (2023, December 13). *Chinese Telecom Giant Huawei Pushes Forward With Ambitious Plan to Dethrone Android*. Forbes. <https://www.forbes.com/sites/ninaxiang/2023/12/13/chinese-telecom-giant-huawei-pushes-forward-with-ambitious-plan-to-dethrone-android/?sh=11b005ad3d50>
- Zhang, X. (2019). Is Huawei a Leverage of the US-China Trade War? A Critical Reflection on the Huawei Case. *China and WTO Review*, 5(1), 207-214. <https://doi.org/10.14330/cwr.2019.5.1.11>