



The Role of the Digital Silk Road in Redirecting Semiconductor Value Chains

Amid U.S.-China Technological Decoupling

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Abstract

This study explores the role of the Digital Silk Road (DSR) as a key geoeconomic tool for China in redirecting semiconductor value chains amid U.S.-China technological decoupling. It examines how China responds to U.S. restrictions in the chip sector by boosting investments in digital and manufacturing infrastructure within Belt and Road Initiative (BRI) countries. Using a descriptive-analytical approach, the research tests the hypothesis that Western restrictions have driven China to establish alternative assembly and testing hubs in nations like Malaysia and Vietnam, while enhancing digital infrastructure to reduce Western dependency. The findings suggest that the DSR is a proactive strategy to build an autonomous technological ecosystem, strengthening China's technological security and global influence.

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1. Introduction

The global economy in the 21st century is undergoing profound structural transformations, with the semiconductor industry (Semiconductors) becoming a significant arena for strategic competition between great powers, especially in light of the escalation of the "chip war" between the United States and China since 2018. As US restrictions evolved into advanced export controls and bans on companies such as Huawei and SMIC, these measures led to a radical restructuring of global value chains (GVCs), which had been built on decades of globalization. In this context, the Digital Silk Road (DSR) stands out as a technological arm of the Belt and Road Initiative (BRI), launched by China in 2013, becoming a crucial geoeconomic tool in the face of technological decoupling and redirecting supply chains towards alternative networks that enhance China's technological autonomy and global influence as evidenced by increasing investments in digital infrastructure to ensure the security of supply chains. With investments in BRI rising to record levels in the first half of 2025, reaching \$66.2 billion in construction contracts and \$57.1 billion in assets, this reflects a strategic Chinese response to US pressure.

Since its launch, the BRI initiative has represented one of the most ambitious geoeconomic projects, aiming to redirect trade and investment flows across infrastructure networks spanning Asia, Africa, and Europe, going beyond the development dimension to form a tool for restructuring GVCs to strengthen China's position in the global economic system. However, this dynamic faces an accelerating structural challenge due to the technological disconnect, which reflects a shift in international competition toward controlling knowledge and technology, as seen in US export controls on chips and artificial intelligence in late 2024 and early 2025. This disconnect has led to shifts in investment and innovation, including the disintegration of traditional links in production networks, and has pushed China toward self-sufficiency, aiming for 50% chip production by 2025.

The semiconductor industry is a central model for this transformation, due to its strategic importance in digital architecture and advanced industries, as it lies at the heart of competition for exports and patents, with efforts to create alternative supply chains that are less dependent on the West. Thus, the interaction between BRI and secession represents an analytical approach to understanding the redistribution of economic influence, especially with the use of DSR to circumvent US barriers in regions such as the Gulf.

This paper aims to analyze the function of the Digital Silk Road as a strategic Chinese initiative in addressing technological decoupling in the semiconductor sector. The investigation is based on the following primary research question: How has the Digital Silk Road become China's primary tool for transforming the way value chains operate in the semiconductor industry, thereby mitigating the effects of technological decoupling with the United States?

Hypotheses

The study relies on two basic hypotheses to examine the issue:

- H1: Western restrictions on chip technology are repositioning Chinese digital investments toward BRI countries, with alternative chip assembly and testing centers being established in partner countries, similar to the reforms in China's supply chain.

- H2: The transformations resulting from technological separation are pushing China to strengthen its control over digital infrastructure via DSR, as a means of reducing dependency on Western technologies, including 5G projects and data centers.

Study objectives

- Analyze the impact of technological constraints on trade and investment flows in the semiconductor sector.
- Evaluate how China will respond by expanding the Belt and Road network as an economic mechanism to overcome restrictions.
- Explore the economic impacts of this strategy on partner countries (in terms of opportunities and risks).

The importance of the study

This study is significant due to its contribution to comprehending global geoeconomic shifts, since semiconductors have emerged as a cornerstone for innovation in the digital and military sectors, boasting a global market value of over \$500 billion annually. The subject also highlights the consequences of technological separation for developing nations within the BRI, which face economic prospects alongside the perils of relying on China. This competition is a sign of a change from a paradigm of integrated globalization to "conditional globalization," which has an effect on international balances and economic security. Furthermore, the subject enhances scholarly inquiry into the utilization of regional initiatives as mechanisms to address external constraints, particularly amid rising geopolitical tensions.

Research methodology:

- The study relies on the descriptive-analytical approach through:
 - Tracing the evolution of US technology constraints policies and Chinese strategic responses.
 - Analysis of specific projects within the Digital Silk Road linked to semiconductor value chains.
- Qualitative and quantitative analysis relying on secondary data from specialized reports and investment and trade data in the sector.
- Comparing value chain patterns before and after the escalation of the chip war.

Structure of the Study

The following structure is used in this study in order to solve the research problem and thoroughly test the hypotheses that have been proposed. Initially, it delineates the theoretical framework, articulating the Digital Silk Road and semiconductor value chains as the conceptual underpinnings of the investigation. Secondly, it investigates the technological decoupling between the United States and China, assessing its catalysts, policies, and ramifications for the semiconductor industry. The study examines the Digital Silk Road's effect in reshaping semiconductor value chains, consequently evaluating two principal hypotheses about material reallocation and digital impact. Fourth, to furnish empirical evidence, the article integrates case studies from specific BRI nations, demonstrating tangible instances of how China's initiatives have transformed value chains in practice.

2. Theoretical Framework

2.1 Digital Silk Road (DSR): Definition, Components, and Scope

Definition: The Digital Silk Road (DSR) represents the technology-focused component of China's Belt and Road Initiative (BRI), which was launched in 2013 to expand economic ties through infrastructure projects (Hillman, 2021). It aims to build digital connectivity and export Chinese technology standards to partner countries, mainly in Asia, Africa, and Europe. The DSR supports China's goal of reducing its dependence on Western technology and increasing its share in global digital markets (Shen, 2018). By 2023, the DSR has involved over 1,334 overseas projects by Chinese firms, with 57% in digital infrastructure (Invesco, 2023).

In terms of definition, the DSR is a set of initiatives that promote digital cooperation under the BRI framework. It includes funding for telecommunications, data centers, and e-commerce systems to connect China with other nations (Erie & Streinz, 2021). Unlike the physical BRI, which focuses on roads and ports, the DSR targets digital gaps in developing economies, helping them adopt technologies like 5G and AI (Kurlantzick, 2022). This approach allows China to gain economic advantages by controlling data flows and standards (Greene & Triolo, 2020). For example, the DSR has been used to install fiber-optic cables in over 70 countries, improving internet access but also raising concerns about data security (Council on Foreign Relations, 2023).

The components of the DSR cover several key areas of digital technology. First, it includes physical infrastructure such as undersea cables, broadband networks, and mobile equipment (Observatory of Economic Complexity, 2024). Second, it involves advanced technologies like artificial intelligence (AI), cloud computing, and big data analytics (Merics, 2024). Third, it supports e-commerce platforms and mobile payment systems, often through companies like Alibaba and Huawei (Shen, 2018).

Table 1. Key Components of the Digital Silk Road

Component	Description	Examples
Telecommunications Networks	Building 5G and fiber-optic systems for faster data transfer	Huawei's 5G projects in Africa
Data Centers and Cloud	Storage and processing facilities for digital services	Alibaba Cloud in Southeast Asia
Artificial Intelligence	Tools for automation and smart cities	AI surveillance in Central Asia
E-commerce and Payments	Platforms for online trade and financial transactions	WeChat Pay expansion in Europe

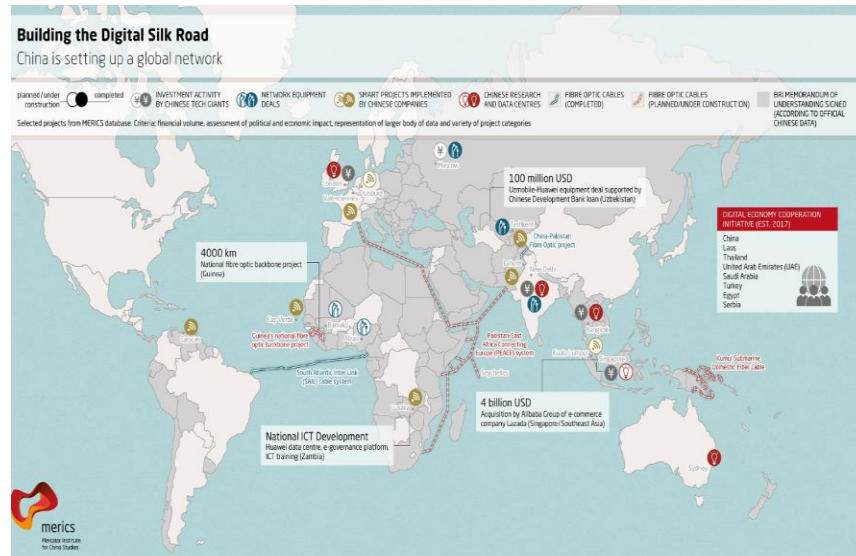
Source : Erie, M. S., & Streinz, T. (2021).

These components help partner countries upgrade their digital systems while giving China access to new markets. Investments in these areas reached \$22 billion between 2017 and 2023, with a focus on telecommunications (Observer Research Foundation, 2025).

The scope of the DSR extends to more than 100 countries participating in the BRI, with strong presence in developing regions. In Africa, for instance, China has funded over \$7 billion in fiber-

optic and telecom projects since 2015 (Merics, 2024). In the first half of 2025, BRI investments, including DSR elements, hit \$57.1 billion, up from previous years (Green Finance & Development Center, 2025).

Fig.1: Map of Digital Silk Road Projects Worldwide

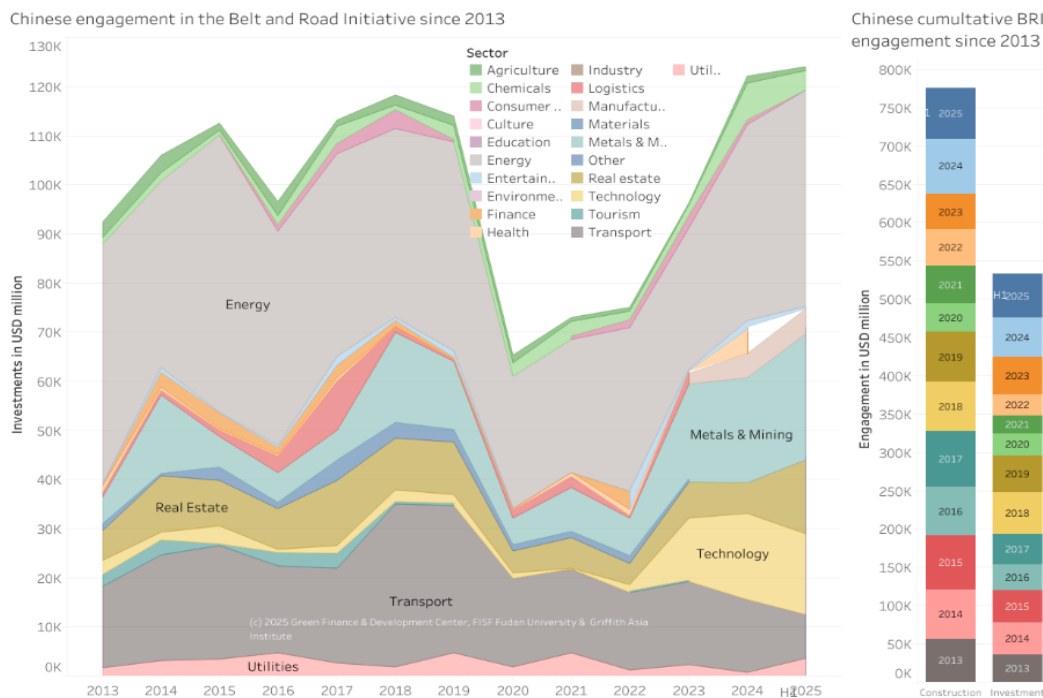


Source: Merics. (2024). Networking the “Belt and Road” - The future is digital.

https://merics.org/sites/default/files/2020-05/Merics_Digital-Silkroad-Tracker_RGB_final_web_0.jpg

This scope reflects China's strategy to reshape global value chains in high-tech sectors. By 2023, cumulative BRI engagement exceeded \$1 trillion, with digital projects accounting for about 8% of global FDI in the sector from 2021 to 2023 (UNCTAD, 2025).

Figure 2: Chart of Investments in Belt and Road Initiative (Including DSR) 2013-2025



Source: Christoph, N., (2025), China Belt and Road Initiative (BRI) Investment Report 2025 H1, p8.

Overall, the DSR's reach helps partner countries' economies flourish, but it also gives China more power over digital standards.

2.2 Semiconductor Value Chains: Structure, Actors, and Global Magnitudes

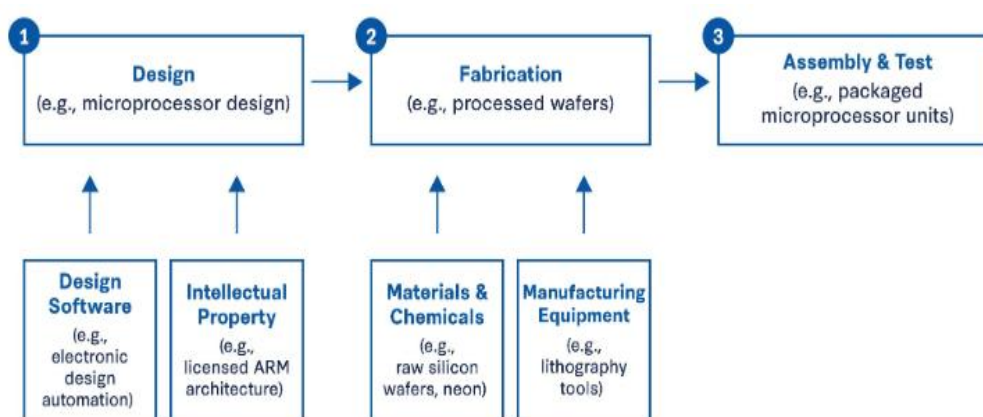
Semiconductor value chains are global networks that produce chips for electronics and other sectors. The chain starts with raw materials and ends with final products. It has become more specialized since the 1990s, with firms focusing on specific stages to cut costs and improve efficiency (OECD, 2025). In 2024, global semiconductor sales reached \$630.5 billion, up from \$505.7 billion in 2021 (Semiconductor Industry Association, 2025; Cognitive Market Research, 2024). Projections show growth to \$755.3 billion in 2025 and \$1,002 billion by 2030, at a 7.7% annual rate (Fortune Business Insights, 2025; PwC, 2024).

The structure includes three main stages: design, fabrication, and assembly, test, and packaging. Design uses software to plan chips. Fabrication builds circuits on wafers. Assembly cuts and packages dies for use (Ciani & Nardo, 2022). This setup relies on trade, with chip exports over \$1,300 billion in 2022 (OECD, 2025). East Asia holds 71% of gross output, led by China at 38% in 2018 (Haramboure et al., 2023).

Key actors are firms in different roles. Fabless companies like Nvidia and Qualcomm design chips but outsource production. Foundries like TSMC and Samsung fabricate wafers. IDMs like Intel handle design and manufacturing. OSAT firms like ASE and Amkor do packaging and testing (PwC, 2024). Countries play roles: Taiwan leads fabrication with 60% of capacity, the US dominates design with 52% market share, and China focuses on assembly (KPMG, 2025).

Global magnitudes show high trade dependence. Equipment exports hit \$270 billion in 2022, up 100% from 2012 (OECD, 2025). AI drives growth, with AI-related spending at \$174 billion in 2025 (KPMG, 2025).

Figure 3: Diagram of Semiconductor Value Chain.



Source : CIS Analyses, Mapping the Semiconductor Supply Chain: The Critical Role of the Indo-Pacific Region, May 2023, p3.

3. Technological Decoupling

3.1 Causes of U.S.–China Technological Decoupling

U.S.-China technological decoupling started in the mid-2010s due to rising concerns over national security and economic competition. Key causes include fears of Chinese technology aiding military advancements and intellectual property theft, which U.S. firms claim costs up to

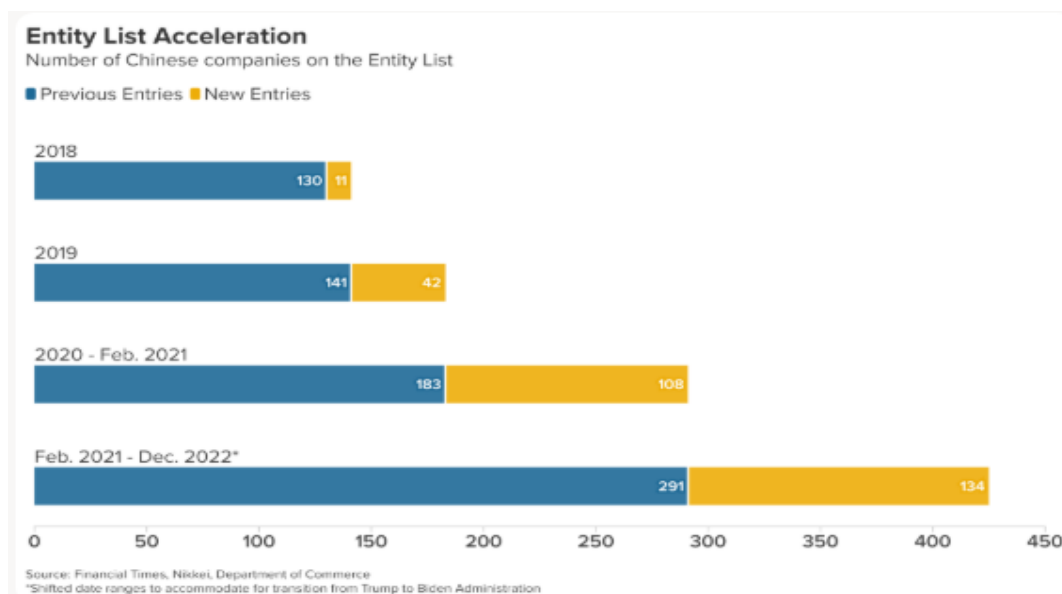
\$600 billion annually (Council on Foreign Relations, 2025). Another factor is China's technological nationalism, pushing for self-reliance through plans like Made in China 2025, seen as a threat to U.S. dominance in sectors like AI and semiconductors (Bateman, 2022). By 2025, these issues have led to broader decoupling, with U.S. policies responding to China's growing market share in global tech exports, reaching 28% in 2024 (World Trade Organization, 2025).

These causes have accelerated since 2018, with trade tensions reducing U.S.-China tech interdependence by 15% from 2019 to 2024 (OECD, 2025).

3.2 Policies and Regulatory Measures

U.S. policies focus on export controls and investment restrictions to limit China's access to advanced tech. The Entity List, managed by the Bureau of Industry and Security, added over 300 Chinese firms by 2025, requiring licenses for exports (U.S. Department of Commerce, 2025). In 2025, new rules under the Export Control Reform Act targeted AI and semiconductors, banning sales of chips below 5nm to Chinese entities (KPMG, 2025). China responded with its own export controls on rare earths, critical for chip production, affecting 20% of global supply (World Bank, 2025). These measures have raised compliance costs for firms by 12% in 2025 (PwC, 2025).

Figure 5: Entity List Growth



Source: JEREMY, M. , DEXTER TIFF, R. ,(2023),United States–China semiconductor standoff: A supply chain under stress - Atlantic Council.available at [United States–China semiconductor standoff: A supply chain under stress - Atlantic Council](#)

The scope of U.S. technological policy towards China has progressively broadened. The approach shifted from selective, firm-level restrictions to a comprehensive strategy designed to constrain the development of China's high-tech ecosystem. This strategic shift is mirrored in the evolution of the policy instruments themselves, which have grown both more precise in their targeting and more extensive in their reach. The following timeline illustrates the key tools and their development:

Phase 1: The Opening Salvo (2018-2019)

- Strategy: Shift from broad tariffs to precise strikes on key Chinese tech champions.
- Key Actions:
 - The U.S. imposed sweeping tariffs on Chinese goods, including technology.
 - Enforced a temporary ban on **ZTE**, demonstrating U.S. leverage.
 - Added **Huawei** to the Entity List, marking the first significant move to cut a Chinese leader off from critical U.S. technology.

Phase 2: Escalation & Widening the Net (2020-2021)

- Strategy: Expand restrictions to foundational technologies and build a coalition.
- Key Actions:
 - Tightened rules specifically to block Huawei's access to semiconductors.
 - Launched the "**Clean Network**" initiative to exclude Chinese apps and platforms.
 - Targeted China's primary chipmaker, **SMIC**, restricting its ability to produce advanced chips.
 - The Biden administration continued and systematized the previous measures.

Phase 3: The Paradigm Shift (2022)

- Strategy: Move from a "entity-specific" to a "technology-centric" model, creating a "small yard, high fence."
- Key Actions:
 - Announced sweeping **October 2022 export controls**.
 - Blocked China's access to both **advanced AI chips** and the **equipment to manufacture them**.
 - This was the most significant step, aiming to freeze China's capabilities at their current level.

Phase 4: Fortifying the Wall (2023-2024)

- Strategy: Close loopholes, internationalize the restrictions, and target financial flows.
- Key Actions:
 - Secured a critical agreement with allies (**the Netherlands and Japan**) to join the export controls.
 - Signed an **outbound investment executive order** to block U.S. venture capital from funding Chinese tech in sensitive sectors.
 - The discovery of an advanced chip in **Huawei's Mate 60 Pro** confirmed China's progress despite restrictions, triggering further scrutiny and tighter enforcement.

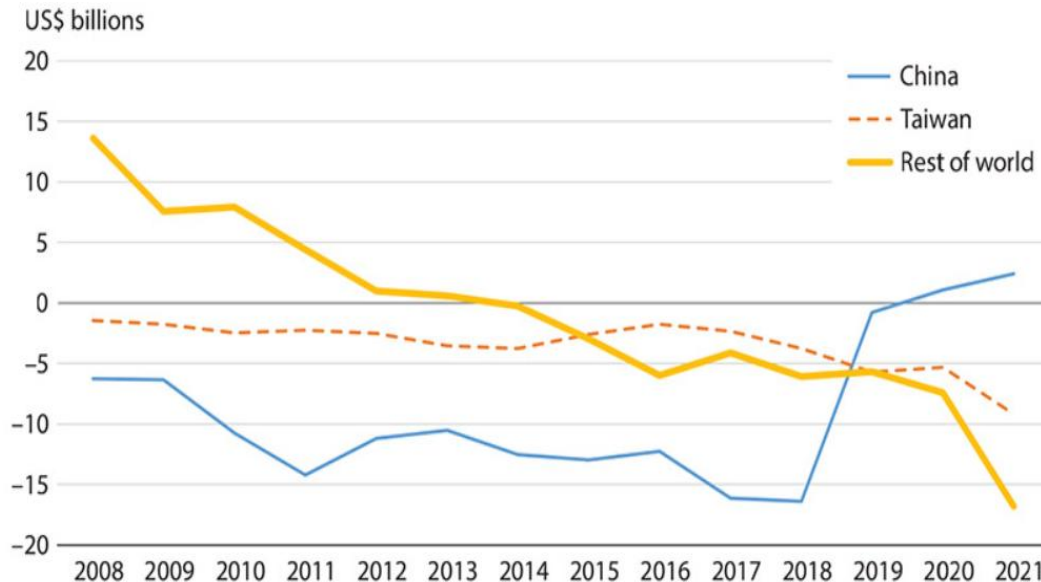
In essence, the U.S. strategy has evolved from **punishing specific companies** to **systematically denying an entire nation access to the foundational technologies** of the 21st century, while mobilizing a coalition of allies to enforce this new technological border.

3.3 Implications for the Semiconductor Sector

Direct impacts on trade and investment have been clear. The restrictions led to quick changes in trade patterns that lasted for decades. China was once a main buyer of U.S. semiconductors, but numbers shifted. For example, China's semiconductor exports to the U.S. fell in targeted areas from \$1.3 billion in 2017 to \$0.7 billion in 2018 (UCL, 2018). Overall trade data show the U.S. semiconductor balance with China moved from a large deficit to a surplus in 2020, showing the restrictions' effect (St. Louis Fed, 2022).

The chart displays changes in semiconductor trade between the U.S. and China. After 2018 restrictions, U.S. exports showed ups and downs with a high in 2021, while imports from China dropped steadily, highlighting protectionist policies and supply chain shifts. (Data from McKinsey and US Import Data)

Figure 6: U.S. Semiconductor Trade Balances with China, Taiwan and the Rest of the World



Source: Miguel D. Fadul and Fernando M. Martin, 2022.

available at [U.S. Trade of Semiconductors: Cross-Country Patterns and Historical Dynamics](#)

However, the situation was more complex. Before full restrictions, Chinese firms increased imports of chip-making equipment from places like the Netherlands and Japan to stock up. In Q3 2023, China's chip equipment imports rose 93%, and lithography imports nearly quadrupled, showing ongoing foreign reliance and efforts to secure supplies (Economics Observatory, 2025). Decoupling disrupts semiconductor supply chains, increasing costs and slowing innovation. U.S. export bans reduced China's access to advanced chips by 40% in 2024, forcing reliance on domestic production, which grew 25% to \$150 billion in 2025 (Semiconductor Industry Association, 2025). Global firms face higher prices, with chip costs up 15% due to rerouted supply (IMF, 2025). Taiwan's role as a key supplier adds risks, with potential disruptions costing \$1 trillion in GDP losses (Bloomberg, 2025).

4. Role of the Digital Silk Road

In response to increasing U.S. pressures, China has not only focused on strengthening its domestic capabilities but has also used its main geo-economic tool, the Belt and Road Initiative (BRI), to change it from a network of ports and railways into a complete technology ecosystem. This strategic change was not just a reaction but activated a broader vision known as the "Digital Silk Road" (DSR), which was added to the initiative in 2015. However, it gained strong momentum after the start of the chip war.

4.1 Material Reallocation of Semiconductor Value Chains

Data shows that Western restrictions have led to a clear redirection of Chinese outward direct investments (ODI). Instead of the traditional focus on energy and infrastructure in developed countries, funds have increasingly flowed to technology and advanced manufacturing sectors in

BRI countries. While total Chinese global investments decreased in the first half of 2025, especially after new U.S. tariffs, investments in strategic sectors like mining and technology in BRI countries remained strong. For example, in H1 2025, BRI engagements reached \$66.2 billion in construction contracts and \$57.1 billion in investments, with a focus on energy and metals (Nedopil Wang, 2025).

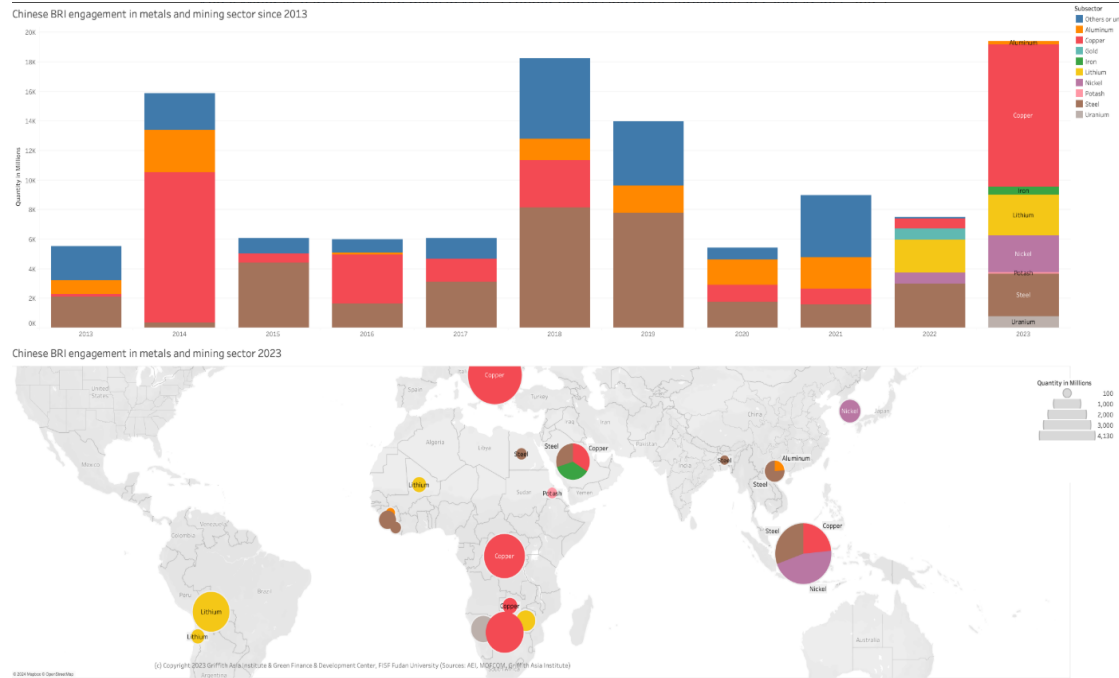
This shift is not random but serves a clear goal of building alternative supply chains that can resist shocks. Two countries have emerged as main destinations for these investments in the semiconductor sector: Malaysia and Vietnam. These two countries have become key centers for the final stages of the semiconductor value chain, which are assembly, testing, and packaging (ATP). This strategy is known as "China+1," where Chinese (and global) companies diversify operations outside China to reduce risks from shocks and tariffs, while benefiting from the geographic closeness and integration with Chinese supply chains.

Malaysia alone holds 13% of the global market for chip assembly, testing, and packaging services, and the Malaysian government aims to increase this to 15% by 2030 (Institute of Strategic & International Studies, 2024). Malaysia has become the preferred destination for Chinese companies seeking to diversify production, benefiting from its semiconductor ecosystem, low operating costs, and relatively neutral position in the U.S.-China conflict. Large investments have flowed from government-backed Chinese companies like Fengshi Metal Technology to Malaysia, along with global giants like Intel and Infineon (Neumann, n.d.). Thus, the data and trends strongly support the first hypothesis (H1), showing that Western restrictions were a main driver for redirecting Chinese investments to BRI countries to create alternative production centers.

4.2 Digital Influence and Strategic Control

China's ambition goes beyond creating alternative assembly factories. The strategic goal is to build a complete technology ecosystem independent of the West, and here the Digital Silk Road plays a role in achieving this aim, supporting the second hypothesis (H2). The BRI is no longer limited to physical infrastructure but has expanded to include undersea and land fiber optic cable networks, data centers, 5G network infrastructure, and satellite navigation systems (BeiDou) (Rasser et al., 2019). By building this digital infrastructure in BRI countries, China not only exports its technologies and standards but also creates a global interconnected network that relies on Chinese technology, reducing the influence of Western standards (Shen, 2018).

An important part of this ecosystem is securing supply chains from the source. China has realized that controlling chip manufacturing requires control over the raw materials needed for it. Recent years have seen a major acceleration in acquisitions by Chinese mining companies of mines in Africa, Latin America, and Central Asia to secure stable supplies of critical minerals like lithium, cobalt, copper, and rare earth elements. In 2024 alone, Chinese acquisition deals in the overseas mining sector reached their highest levels in more than a decade, with 10 deals each over \$100 million (The Oregon Group, 2025). These investments, often within the BRI framework, are not just business deals but are a key part of China's strategy to ensure its technology security and reduce opponents' ability to use natural resources as pressure tools.

Figure 7: Chinese BRI engagement in metals and mining 2013 – 2023 H1

Source: Christoph Nedopil ,2024, p14.

The chart shows steady growth in China's investments within the Belt and Road Initiative, with a notable increase in the share directed toward strategic sectors like technology and mining, especially after 2020, supporting the hypothesis of a shift toward building an independent technology ecosystem. (Data compiled from Green Finance & Development Center and CNBC Arabia) (Nedopil Wang, 2025).

These external efforts integrate with large domestic initiatives. China has launched government investment funds worth billions of dollars to support the local chip industry, such as the National Integrated Circuit Industry Investment Fund, which raised more than \$47 billion in its third round (Yao & Blanchard, 2024). Building an external network through the BRI is not a substitute for local development but complements it; it provides strategic depth, secures resources, and creates new markets for Chinese technology, strongly supporting the second hypothesis (H2) that China uses the initiative to build an independent technology ecosystem resistant to external pressures.

With the BRI turning into a main arena in the chip war, partner countries have found themselves as a key element in the Chinese-U.S. conflict. These countries are no longer just recipients of traditional infrastructure projects but have become potential players in global technology value chains. This change opens unprecedented opportunities for them, but at the same time exposes them to complex risks and challenges. Assessing these dual effects is very important for understanding the future of these countries and their role in the new global economic system.

5. Case Studies

The experiences of partner countries vary greatly, but some models stand out as clear examples of the new dynamics caused by technology decoupling.

5.1 Malaysia: The Rising Giant in Assembly and Packaging

Malaysia is the clearest example of countries that have directly benefited from restructuring supply chains. Thanks to its long history in the electronics industry spanning five decades, strong infrastructure, and skilled workforce, Malaysia has become a leading global center in

semiconductor assembly, testing, and packaging (ATP). The country currently holds 13% of the global market in this vital field (Institute of Strategic & International Studies, 2024). Billions of dollars in investments have flowed from global companies like Intel, Infineon, and Texas Instruments, in addition to Chinese companies applying the "China+1" strategy. In response to this momentum, the Malaysian government launched the "New Industrial Master Plan 2030," an ambitious strategy aimed at attracting more investments and moving from low-value assembly stages to higher-value activities like integrated circuit design and chip manufacturing (ASEAN Briefing, 2025).

5.2 Vietnam: The New Global Manufacturing Center

Similar to Malaysia, Vietnam has emerged as a preferred destination for foreign direct investment in the technology sector, benefiting from its political stability, competitive costs, and free trade agreements. Vietnam has quickly turned into a global manufacturing center, where trade between it and the United States rose from about \$77 billion in 2018 to around \$123 billion in 2022 (U.S. Census Bureau, 2023). In the semiconductor sector, Vietnam focuses on attracting investments in assembly and design. The Vietnamese government has announced ambitious plans to develop local capabilities, aiming to design and manufacture its own chips by 2027 and train thousands of specialized engineers (Vietnam News, 2025). This ambition reflects Vietnam's desire not to settle for a secondary role in the value chain but to seek to become a full player.

5.3 Pakistan and the Middle East: Emerging Ambitions

In other BRI regions, ambitions are still in early stages but promising. In Pakistan, Chinese companies like Loongson Technology have shown interest in investing to establish a semiconductor design and manufacturing industry, prompting the Pakistani government to form a committee to draft a national policy for the sector (Ministry of Information Technology and Telecommunication, n.d.). In the Middle East, Israel plays an interesting role, where its semiconductor exports to China increased by 80% in 2018, partly due to sales from Intel's factory in Israel, which some see as an indirect channel to bypass some U.S. restrictions (Scheer & Nellis, 2019). Gulf countries, as part of their economic visions (like Vision 2030), seek to enhance technology cooperation with China as part of economic diversification strategies.

5.4 Opportunities Available to Partner Countries

The main opportunities provided by these changes are:

- Attracting foreign direct investment (FDI): These countries have become attractive destinations for investments in high-tech sectors, contributing to economic growth and creating high-skill jobs.
- Technology and knowledge transfer: The presence of global and Chinese companies provides an opportunity for technical and managerial knowledge transfer, local workforce development, and building an innovation ecosystem.
- Integration into global value chains: This change allows partner countries to upgrade from exporting raw materials to participating in advanced manufacturing stages, increasing the added value to their economies.

5.5 Risks and Challenges

On the other hand, these countries face serious risks that require careful management:

- Excessive dependence on China: There is a real risk that increasing reliance on Chinese investments and technology leads to a new form of dependence, limiting political and economic decision-making independence.
- Exposure to restrictions: Deep involvement in Chinese technology supply chains may expose these countries to U.S. pressures or secondary sanctions. Washington closely monitors any attempts to circumvent its restrictions and may seek to hinder efforts of companies in allied countries that help China (Miller, 2025).
- Limited upgrade in the value chain: The biggest risk is that these countries remain stuck in low-value stages (assembly and testing), without achieving a qualitative leap toward advanced design and manufacturing. This is known as the "middle-income trap" in technology, where the country remains dependent on low-cost manufacturing without developing real innovation capabilities.
- Local challenges: Most of these countries face major internal challenges, such as a shortage of specialized talents, weak local funding for research and development, and the need for advanced digital and legislative infrastructure to support such a complex industry.

6. CONCLUSION

This study concludes that the Digital Silk Road has emerged as a fundamental strategic instrument for China to counteract the impacts of its technological decoupling with the United States, particularly within the critical semiconductor sector. The findings have clearly validated the first hypothesis (H1), demonstrating that U.S. restrictions have led to a tangible redirection of Chinese investments toward BRI countries. Nations such as Malaysia and Vietnam have transformed into vital hubs for Assembly, Testing, and Packaging (ATP) of chips, evidenced by significant investment growth.

Furthermore, the results confirm the second hypothesis (H2), as China's response extends beyond the material reallocation of value chains to encompass the construction of an integrated and independent technological ecosystem. Through strategic investments in digital infrastructure—such as 5G networks and data centers—and securing raw material supply chains, China is leveraging the DSR to minimize its reliance on Western technologies and bolster its strategic control.

However, the study also reveals that this transformation creates a dual reality for partner countries. While it presents opportunities to attract foreign direct investment and integrate into global value chains, it also exposes them to the risks of over-dependence on China and being caught in geopolitical crossfire. In sum, the Digital Silk Road is no longer just a technological arm of the BRI; it has become a primary arena through which China is reshaping the global economic geography, attempting to build a parallel technological order resilient to external pressures and capable of securing its ascent as an international tech superpower.

7. Bibliography List:

- ASEAN Briefing. (2025, March 17). Malaysia's semiconductor growth: Can it move up the value chain? <https://www.aseanbriefing.com/news/malaysias-semiconductor-growth-can-it-move-up-the-value-chain/>
- Bateman, J. (2022). U.S.-China technological "decoupling": A strategy and policy framework. Carnegie Endowment for International Peace. <https://carnegieendowment.org/2022/04/25/u.s.-china-technological-decoupling-strategy-and-policy-framework-pub-86946>
- Bloomberg. (2025). Semiconductor supply chain risks. Bloomberg Intelligence Report.
- Bonnet, A., & Ciani, A. (2023). Monitoring EU supply chain bottlenecks: Focus on semiconductors. European Commission.
- Ciani, A., & Nardo, M. (2022). Mapping the semiconductor value chain: The EU perspective. European Commission Joint Research Centre.
- Cognitive Market Research. (2024). Semiconductor market report (Global Edition). <https://www.cognitivemarketresearch.com/semiconductor-market-report>
- Council on Foreign Relations. (n.d.). China's Digital Silk Road Initiative | The Tech Arm of the Belt and ... <https://www.cfr.org/china-digital-silk-road/>
- Council on Foreign Relations. (2025). The contentious U.S.-China trade relationship. <https://www.cfr.org/background/contenious-us-china-trade-relationship>
- CSIS. (2023). Mapping the semiconductor supply chain. <https://www.csis.org/analysis/mapping-semiconductor-supply-chain-critical-role-indo-pacific-region>
- Erie, M. S., & Streinz, T. (2021). The Beijing effect: China's Digital Silk Road as transnational data governance. *New York University Journal of International Law and Politics*, 54(1), 1-92.
- Fortune Business Insights. (2025). Semiconductor market size, share, growth & forecast [2032]. <https://www.fortunebusinessinsights.com/semiconductor-market-102365>
- Greene, R., & Triolo, P. (2020). Will China control the global internet via its Digital Silk Road? Carnegie Endowment for International Peace. <https://carnegieendowment.org/2020/05/08/will-china-control-global-internet-via-its-digital-silk-road-pub-81857>
- Griffith Asia Insights. (2025). China Belt and Road Initiative (BRI) investment report 2025. <https://blogs.griffith.edu.au/asiainsights/china-belt-and-road-initiative-bri-investment-report-2025/>
- Haramboure, M., et al. (2023). Global value chain development report 2023. WTO.
- Hillman, J. E. (2021). The Digital Silk Road: China's technological rise and the geopolitics of 5G. Council on Foreign Relations Press.
- Huang, S. (2023). SiC wafer market analysis. Industry Report.
- Institute of Strategic & International Studies. (2024, June 20). Malaysia's semiconductor ecosystem amid geopolitical flux. <https://www.isis.org.my/2024/06/20/malaysias-semiconductor-ecosystem-amid-geopolitical-flux/>
- International Monetary Fund. (2025). World Economic Outlook 2025. IMF Publications.
- Invesco. (2023). Evolution of China's Belt and Road Initiative: Digital Silk Road. <https://www.invesco.com/content/dam/invesco/apac/en/pdf/insights/2023/march/invesco-evolution-of-chinas-belt-and-road-initiative-digital-silk-road-mar23.pdf>

- KPMG. (2025). Global semiconductor industry outlook 2025. <https://kpmg.com/kpmg-us/content/dam/kpmg/pdf/2025/global-semiconductor-industry-outlook-2025.pdf>
- Kurlantzick, J. (2022). Beijing's global media offensive: China's uneven campaign to influence Asia and the world. Oxford University Press.
- Merics. (2024). Networking the “Belt and Road” - The future is digital. <https://merics.org/en/tracker/networking-belt-and-road-future-digital>
- Miller, N. D. (2025, September 15). Hard then, harder now: CoCom's lessons and the challenge of crafting effective export controls against China. <https://tnsr.org/2025/09/hard-then-harder-now-cocom-lessons-and-the-challenge-of-crafting-effective-export-controls-against-china/>
- Ministry of Information Technology and Telecommunication. (n.d.). National Semiconductor Policy - Draft. <https://moitt.gov.pk/Detail/MDc4MjEyNTItMTI2Yy00OWZmLTg3NTAtNTBIZGU0NmIzM2Q5>
- Nedopil Wang, C. (2025, July 17). China Belt and Road Initiative (BRI) investment report 2025 H1. <https://greenfdc.org/china-belt-and-road-initiative-bri-investment-report-2025-h1/>
- Neumann, A. L. (n.d.). Malaysia's hot hand in tech investment. https://www.globalasia.org/v19no2/cover/malaysias-hot-hand-in-tech-investment_a-lin-neumann
- Observer Research Foundation. (2025). The Digital Silk Road and smart city networks in the Indo-Pacific. <https://www.orfonline.org/research/the-digital-silk-road-and-smart-city-networks-in-the-indo-pacific-a-primer>
- Observatory of Economic Complexity. (2024). China's Digital Silk Road. <https://oec.world/en/blog/post/chinas-digital-silk-road>
- OECD. (2025). Mapping the semiconductor value chain. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/mapping-the-semiconductor-value-chain_5ba52971/4154cdbf-en.pdf
- Organisation for Economic Co-operation and Development. (2025). Trade in value added database. OECD.stat.
- PwC. (2025). State of the semiconductor industry. <https://www.pwc.com/gx/en/industries/technology/state-of-the-semiconductor-industry-report.pdf>
- Rasser, M., Riikonen, A., & Morgus, R. (2019). China's Digital Silk Road: Strategic technological competition and exporting political illiberalism. https://pacforum.org/wp-content/uploads/2019/08/issuesinsights_Vol19-WP8FINAL.pdf
- Scheer, S., & Nellis, S. (2019, March 18). Exclusive: Israel's chip sales to China jump as Intel expands. <https://www.reuters.com/article/technology/exclusive-israels-chip-sales-to-china-jump-as-intel-expands-idUSKCN1R00DG/>
- Semiconductor Industry Association. (2025). 2025 state of the industry report: Investment and innovation amidst global challenges and opportunities. <https://www.semiconductors.org/2025-state-of-the-industry-report-investment-and-innovation-amidst-global-challenges-and-opportunities>
- Shen, H. (2018). Building a Digital Silk Road? Situating the Internet in China's Belt and Road Initiative. https://www.andrew.cmu.edu/user/hongs/files/Silk.Road_IJOC2018.pdf

- The Oregon Group. (2025, July 7). China's overseas mining acquisitions hit 10-year high. <https://theoregongroup.com/commodities/cobalt/chinas-overseas-mining-acquisitions-hit-10-year-high/>
- U.S. Census Bureau. (2023). Trade in goods with Vietnam. <https://www.census.gov/foreign-trade/balance/c5520.html>
- U.S. Department of Commerce. (2025). Entity list updates. Bureau of Industry and Security. <https://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/entity-list>
- UNCTAD. (2025). World Investment Report 2025: International investment in the digital economy. <https://unctad.org/publication/world-investment-report-2025>
- Vietnam News. (2025, August 4). Việt Nam must strive to independently manufacture semiconductor chips by 2027: PM. <https://vietnamnews.vn/politics-laws/1722635/viet-nam-must-strive-to-independently-manufacture-semiconductor-chips-by-2027-pm.html>
- World Bank. (2025). Global economic prospects. World Bank Group.
- World Economic Forum. (2025). Tech impact from US policy pivot on chip sales in China. <https://www.weforum.org/stories/2025/08/us-policy-chip-sales-china-semiconductor-global-tech/>
- World Trade Organization. (2025). World trade statistical review 2025. WTO Publications.
- Yao, K., & Blanchard, B. (2024, May 27). China sets up third fund with \$47.5 bln to boost semiconductor sector. <https://www.reuters.com/technology/china-sets-up-475-bln-state-fund-boost-semiconductor-industry-2024-05-27/>