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Vietnam–U.S. Cooperation in High Technology and Supply Chains: Opportunities for Innovation and Human Resource Development

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Abstract

In the context of global supply chain restructuring and intensifying technological competition, high technology and supply chains have become increasingly important areas of Vietnam–U.S. cooperation. This article examines the development of bilateral cooperation in these areas from 2013 to 2026, particularly since the establishment of the Comprehensive Strategic Partnership in 2023. Using historical and logical analysis, comparative analysis, and analytical synthesis, the study focuses on science and technology cooperation, particularly in semiconductors, integrated circuit design, artificial intelligence, and R&D, as well as supply chain development, with semiconductors as a prominent case. The findings show that cooperation is expanding from investment and production into design, R&D, and more knowledge-intensive activities, while supply chain diversification enables Vietnam to participate more deeply in global production and technology networks. These developments create opportunities to promote innovation, advance human resource development, and enhance Vietnam's position in global technology networks. Realizing these opportunities, however, depends on technological absorptive capacity, workforce quality, linkages among firms, universities, and research institutes, and the development of the innovation ecosystem. The long-term significance of cooperation therefore lies in Vietnam's ability to translate these opportunities into domestic technological capabilities, innovation capacity, and a highly skilled workforce.

Keywords: High technology, human resource development, innovation, supply chains, Vietnam–U.S. relations

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1. Introduction

Rapid changes in the global economy and technology are reshaping production networks and supply chains worldwide. Advances in artificial intelligence, semiconductors, and digital technologies, together with post-COVID-19 supply chain disruptions, have increased the importance of high technology and strategic supply chains. The need for greater resilience has prompted countries and multinational corporations to diversify production, investment, and supply sources, creating new opportunities for technology and supply chain cooperation between the United States and partners with manufacturing capabilities and technological potential.

Science and technology have become increasingly important in Vietnam–U.S. relations. From the establishment of the Comprehensive Partnership in 2013 to the Comprehensive Strategic Partnership (CSP) in 2023, bilateral cooperation has expanded from trade and investment to more technology- and knowledge-intensive areas. The 2023 upgrade created a new framework for

cooperation in semiconductors, artificial intelligence, R&D, innovation, and human resource development, while supply chain diversification has created further opportunities for Vietnam to participate in global production and technology networks. Semiconductors illustrate the intersection of these two dimensions of cooperation.

Although Vietnam–U.S. relations have been examined from various perspectives, the relationship between high-tech cooperation, supply chains, and Vietnam's innovation capacity and human resource development remains insufficiently examined within an integrated analytical framework. This gap is important because increased investment and production relocation do not automatically translate into stronger technological capabilities or a higher position in the value chain. This article therefore examines the development of Vietnam–U.S. cooperation in high technology and supply chains during 2013–2026, focusing on science and technology cooperation, Vietnam's role in supply chain diversification, and semiconductors as a prominent case. It further assesses the opportunities and conditions for translating such cooperation into innovation capacity and human resource development.

2. Literature Review and Research Methods

2.1. Literature Review

Vietnam–U.S. cooperation in science, technology, and high-tech industries has attracted growing scholarly attention. Existing studies identify technology, semiconductors, digital transformation, advanced manufacturing, and supply chains as increasingly important areas of bilateral cooperation (Huynh & Vo, 2023; Biswas, 2023). Within this agenda, semiconductors have drawn particular attention because of their strategic importance and highly specialized value chain. Studies highlight Vietnam's growing potential in regional semiconductor networks while emphasizing the importance of institutional capacity, technological ecosystems, infrastructure, skilled human resources, and capabilities in higher-value-added activities (Nguyen Xuan Dong, 2026; Wang et al., 2024; Tran et al., 2025). The fragmentation and interdependence of semiconductor design, fabrication, equipment, materials, assembly, packaging, and testing further provide an important basis for assessing Vietnam's position in U.S.-linked supply chains (Thadani & Allen, 2023).

Related research examines how FDI and participation in global value chains affect domestic technological upgrading. Access to international production networks can facilitate knowledge and technology transfer, but outcomes depend substantially on firms' absorptive capacity, innovation capabilities, the domestic business environment, and linkages between FDI and local firms (Rigo, 2021; Nguyen et al., 2021; Hoang et al., 2022, 2026; OECD, 2025, 2026). Human resources are similarly important, particularly given shortages of highly skilled workers in Vietnam's semiconductor ecosystem and the need for stronger coordination among public policy, education, and industry (Tran et al., 2025; Nguyen & Bui, 2026).

Overall, the literature addresses Vietnam–U.S. technology cooperation, semiconductor supply chains, FDI, innovation, and human resources, but it has not examined their interconnections within a unified analytical framework. This article addresses this gap by linking the development of bilateral cooperation in high technology and supply chains with its potential contribution to Vietnam's innovation capacity and human resource development.

2.2. Methodology

The study combines historical and logical analysis, comparative analysis, and analytical synthesis. Historical and logical analysis traces the development of Vietnam–U.S. science and technology cooperation, with the establishment of the Comprehensive Partnership in 2013 and the Comprehensive Strategic Partnership in 2023 as key milestones. Comparative analysis examines the characteristics of high-tech and supply chain cooperation, particularly Vietnam's participation at different stages of the semiconductor value chain and its potential to shift toward more knowledge-intensive, higher-value-added activities. Analytical synthesis connects these findings with opportunities for innovation and human resource development and identifies the conditions shaping their realization.

As cooperation in semiconductors, AI, and technology supply chains has intensified only in recent years, long-term evidence on outcomes and impacts remains limited. The study therefore focuses on the development of cooperation, emerging trends, opportunities, and prospects rather than quantifying or establishing causal relationships between Vietnam–U.S. cooperation and innovation and human resource development.

3. Results and Discussion

3.1. Vietnam–U.S. Science and Technology Cooperation

3.1.1. Foundations and Development of Science and Technology Cooperation

Vietnam–U.S. science and technology cooperation has developed on the basis of complementary needs and strengths. Vietnam seeks access to advanced technologies and stronger research, innovation, and human resource capacity to support the transformation of its growth model, while the United States has strengths in capital, research and development (R&D), higher education, innovation ecosystems, and high-tech industries. This complementarity has provided a foundation for expanding science and technology cooperation. Institutionally, the Vietnam–U.S. Science and Technology Cooperation Agreement, signed in 2000, established a formal framework for cooperation. However, during the initial period after the normalization of relations, science and technology cooperation remained a specialized area as bilateral relations broadened.

The establishment of the Vietnam–U.S. Comprehensive Partnership in 2013 provided a framework for further expansion. It moved beyond investment and technology application to more knowledge-intensive areas, most notably semiconductors, integrated circuit design, R&D, AI, and technology infrastructure. This process was driven by U.S. corporations in Vietnam, which created a corporate, technical, and human resource foundation for high-tech cooperation.

A significant shift occurred in September 2023, when Vietnam and the United States established a CSP for Peace, Cooperation and Sustainable Development, expanding the scale, institutionalization, and scope of science and technology cooperation. The Joint Statement identified science, technology, and innovation as a "new breakthrough in the Comprehensive Strategic Partnership" (Chinhphu.vn, 2023d), emphasizing the semiconductor ecosystem, emerging technologies, digital infrastructure, research, STEM education, and human resource development in high technology. At the Vietnam–U.S. Summit on Investment and Innovation, the two sides agreed to promote technology, innovation, and investment as a new pillar of bilateral relations (Chinhphu.vn, 2023c). These commitments marked greater institutionalization of science and technology cooperation and provided a basis for initiatives in semiconductors, advanced technologies, research, and human resource development. This aligns with Huynh and Vo's (2023) assessment of technology as a new driver of Vietnam–U.S. relations and reinforces Biswas's (2023) observation that the bilateral agenda has expanded from trade and investment to technology, advanced manufacturing, and supply chains.

3.1.2. Cooperation in Key High-Tech Areas

In semiconductor technology and integrated circuit design, the foundations for cooperation were well established during 2013–2022. In March 2014, On Semiconductor inaugurated an expanded facility in Bien Hoa 2 Industrial Park with an investment of approximately USD 75 million. Intel has invested approximately USD 1.5 billion in its facility in Ho Chi Minh City, establishing one of the company's important assembly and testing sites within its global network (Chinhphu.vn, 2023b). The presence of Synopsys and Marvell indicates expansion into integrated circuit design, design software, and R&D. From 2020 to 2022, the company expanded to three offices in Ho Chi Minh City and Da Nang, employing nearly 500 engineers, while cooperating with domestic education and technology institutions on integrated circuit design and technical capacity development (Nhĩ Anh, 2023). Marvell expanded from five engineers in 2013 to more than 500 in 2025, making Vietnam the company's third-largest R&D center after the United States and India (Marvell Technology, 2025). Marvell's activities also expanded from design verification into integrated circuit design, software, and firmware.

Semiconductor and advanced-technology cooperation has also been strengthened through government mechanisms. Under the CSP, the two countries launched initiatives, including the Developing Electronics & Leading Technology Advancement Partnerships (DELTA) Network, the Vietnam–U.S. Science and Technology Agreement for Research (VUSTAR), and the International Technology Security and Innovation Fund (ITSI). DELTA promotes supply chain linkages; VUSTAR expands joint research in AI, health, climate, and biotechnology; and ITSI supports semiconductor ecosystem development through policy frameworks, human resources, and capacity building. Together, these initiatives mark a shift beyond direct corporate investment toward institutional mechanisms linking research, industry, and human resource development.

AI and R&D became more prominent areas of cooperation after 2023. Following its late-2023 commitment to expand operations in Vietnam, NVIDIA and FPT signed a USD 200 million agreement in 2024 to develop an AI Factory and computing infrastructure for AI research (FPT, 2024). In December 2024, the Vietnamese Government and NVIDIA signed another agreement to establish an AI R&D Center and an AI Data Center in Vietnam. The R&D Center is intended to develop software and connect businesses, startups, universities, students, and the research community. NVIDIA's expansion through VinBrain suggests that Vietnam–U.S. cooperation in AI is shifting from technology and infrastructure toward R&D and stronger ties to Vietnam's domestic innovation ecosystem.

This trend continued as U.S. corporations established R&D facilities directly in Vietnam. On May 12, 2026, Qualcomm

Technologies inaugurated an R&D Center in Hanoi focused on AI and system-on-chip (SoC) development, with plans to expand into automotive technology, the Internet of Things (IoT), and other advanced fields (Hoàng An & Bảo Bình, 2026). The Center is intended to conduct R&D in Vietnam with Vietnamese engineers, linking international companies' R&D activities with Vietnam's human resources and technological ecosystem. Technology cooperation has also extended to semiconductor manufacturing equipment, as evidenced by Lam Research's consideration since 2024 of developing manufacturing and supply chain activities in Vietnam. Lam Research's interest adds another technological field alongside integrated circuit design, AI, and R&D, one directly related to the technologies and equipment used in semiconductor manufacturing. Beyond semiconductors and AI, technology cooperation has expanded into several areas of advanced manufacturing and applied technologies. In 2024, 3M opened a Science, Technology and Engineering Center in Hanoi, reflecting U.S. companies' expansion of innovation and technical support activities in Vietnam.

Digital infrastructure and technological connectivity have also emerged as areas of cooperation. SpaceX is expected to invest approximately USD 1.5 billion in Vietnam to provide broadband internet connectivity through Starlink satellite internet services. In March 2025, Vietnam authorized a controlled pilot of telecommunications services using SpaceX's low-Earth-orbit satellite technology. On August 13, 2026, Starlink began providing satellite internet services in Vietnam. Low-Earth-orbit satellite technology has expanded Vietnam–U.S. technology cooperation into next-generation connectivity infrastructure.

These developments indicate that cooperation since 2023 has expanded not only in the number of projects but also in the types of activities involved, consistent with the shift toward advanced manufacturing and technology-intensive activities identified in recent studies (Biswas, 2023; Huynh & Vo, 2023).

3.2. Supply Chain Cooperation

3.2.1. Vietnam in Supply Chain Diversification

Strengthening supply chain resilience and diversification has become an important element of U.S. external economic policy. Post-COVID-19 disruptions, production concentration, and geoeconomic uncertainties have prompted the U.S. government and businesses to diversify partners, production locations, and supply sources. Vietnam has attracted growing attention as a potential location in this diversification process. During her visit to Hanoi in July 2023, U.S. Treasury Secretary Janet Yellen emphasized this diversification for economic resilience and Vietnam's role as a partner (U.S. Department of the Treasury, 2023).

Vietnam's position is supported by several geographical, manufacturing, and integration advantages. Its location in Southeast Asia, proximity to major Asian manufacturing centers, and connections to international trade routes facilitate participation in regional production networks. Political stability, policies of economic integration and investment attraction, and relatively competitive production costs contribute to Vietnam's attractiveness for long-term investment. Its labor force and domestic market provide favorable conditions for production and investment: in 2026, Vietnam's population was approximately 102.3 million (Dân số Việt Nam, 2026), with nearly 70% of the population of working age.

Vietnam's network of free trade agreements, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the EU–Vietnam Free Trade Agreement (EVFTA), and the Regional Comprehensive Economic Partnership (RCEP), expands its connections with external markets. U.S. firms investing and producing in Vietnam can leverage this trade network to organize value chains and access markets. Vietnam's potential role in this process rests on both production costs and its position within regional trade and production networks.

Under the Biden administration, this trend was reflected in a friendshoring approach that emphasized stronger supply chain linkages with trusted partners. Vietnam was regarded as a partner, particularly in the semiconductor sector. Studies indicate that Vietnam can expand its role in regional semiconductor networks. However, its ability to upgrade depends on technological capabilities, infrastructure, and human resources (Wang et al., 2024). The establishment of the CSP in September 2023 provided a framework that more closely links supply chain diversification with technology cooperation, investment, and semiconductor ecosystem development.

3.2.2. Cooperation in Semiconductor Supply Chain Development

Semiconductor supply chain development has become a prominent feature of Vietnam–U.S. relations, particularly since the establishment of the CSP in September 2023. Building on Vietnam's electronics manufacturing base and U.S. firms, bilateral engagement has expanded from assembly, packaging, and testing into integrated circuit design, manufacturing equipment, and ecosystem development. According to John Neuffer, President and CEO of the U.S. Semiconductor Industry Association,

Vietnam is an attractive destination for U.S. semiconductor companies and could become an important partner in workforce development for the industry (Chinhphu.vn, 2023a).

Assembly, packaging, and testing are the most prominent areas of bilateral engagement in the semiconductor supply chain. Intel has invested approximately USD 1.5 billion in its assembly and testing facility in Ho Chi Minh City. By 2025, Intel Products Vietnam accounted for more than 50% of the output of the company's global assembly and testing network (Hải Lâm, 2025). Alongside Intel, Amkor Technology began operating its Bac Ninh facility in 2023, with a planned total investment of approximately USD 1.6 billion, focusing on semiconductor packaging and testing. The facility is intended to provide packaging and testing services for semiconductor products used in AI, smartphones, networking, automobiles, and high-performance computing. After commencing operations in August 2024, the facility exported its first shipment in September 2024; by May 2026, Amkor had proposed increasing its maximum annual capacity from approximately 675 million to 1.2 billion units (Bạch Dương, 2026). These projects indicate that Vietnam has developed relatively clear capabilities in the back-end stages of the semiconductor supply chain.

Bilateral activity has also expanded into integrated circuit design through Marvell and Synopsys. While Intel and Amkor reflect Vietnam's strengths in back-end operations, design activities indicate gradual participation in more knowledge-intensive functions. This trend is consistent with the requirements for upgrading Vietnam's position in the semiconductor value chain, which depends not only on attracting investment but also on technological capabilities and the development of the domestic ecosystem (Nguyen Xuan Dong, 2026). Marvell and Synopsys diversify Vietnam's participation across the semiconductor value chain.

Another segment is semiconductor manufacturing equipment. In 2024, Lam Research, one of the leading U.S. suppliers of chip manufacturing equipment, planned to cooperate with South Korea's Seojin to develop manufacturing facilities and supply chain operations in Vietnam, with an expected initial scale of USD 1–2 billion; the company also considered direct investment in subsequent phases (Chinhphu.vn, 2024b). The Lam Research case suggests bilateral activity may extend from chips to equipment used in semiconductor manufacturing. This reflects the specialized, interdependent nature of the global semiconductor supply chain, in which design, equipment, fabrication, assembly, packaging, and testing are distributed across multiple firms and economies (Thadani & Allen, 2023). The significance of cooperation lies not in participation across the entire value chain, but in its ability to strengthen segments where it already has advantages and gradually expand into higher-value functions with greater technological content.

Government support mechanisms have reinforced bilateral coordination since 2023. Vietnam is among the partners the United States selected to implement the International Technology Security and Innovation Fund (ITSI) under the CHIPS and Science Act. The Fund allocates USD 500 million over five years to international efforts to strengthen semiconductor supply chain security and resilience (U.S. Department of State, 2022). The National Innovation Center (NIC), the U.S. Department of State, and Arizona State University launched ITSI in Vietnam in September 2024, focusing on workforce development and strengthening the semiconductor ecosystem.

3.3. Opportunities and Prospects for Cooperation

3.3.1. Opportunities for Innovation

Expanding high-tech and supply chain cooperation with the United States creates opportunities to access knowledge and strengthen domestic innovation capability. However, participation in global value chains does not automatically strengthen this capability. Outcomes depend on firms' absorptive capacity and the domestic innovation environment (Rigo, 2021; Hoang et al., 2022, 2026). This matters because Vietnam is relatively well integrated into high-tech trade flows while its capacity for knowledge creation remains weaker. According to the Global Innovation Index 2025, Vietnam ranked 44th among 139 economies and 37th in innovation outputs, but 50th in innovation inputs, 70th in human capital and research, and 100th in knowledge-intensive employment (World Intellectual Property Organization [WIPO], 2025). This gap shows that Vietnam must not only access technology but also translate external technology and knowledge into domestic innovation capability.

Cooperation with the United States in semiconductors, AI, integrated circuit design, R&D, and other advanced fields broadens access to knowledge and expertise. Its value lies not only in equipment or finished products, but also in technical platforms, design tools, research processes, technical standards, and approaches to organizing R&D. As Vietnamese firms and research organizations become involved in research, design, testing, and product development, cooperation can create learning channels beyond conventional technology transfer. This may strengthen domestic actors' capacity to absorb, adapt, and apply technology.

A second opportunity is spillovers from U.S. corporations to Vietnamese firms and startups. The Qualcomm Vietnam Innovation Challenge (QVIC), implemented since 2019 with support from Vietnam's Ministry of Science and Technology, supports innovative enterprises in 5G, IoT, AI, smart cities, and emerging fields through technical, intellectual property, and business support (Qualcomm, 2026). At QVIC 2025, Rainscales developed an AI-based safety monitoring platform; Viet Dynamic developed a machine-vision system for quality control in manufacturing; and Enfarm Agritech developed an AI-enabled sensor solution for precision agriculture. These cases show that U.S. firms' technological platforms can be combined with Vietnamese enterprises' product development capabilities to create new applications, rather than being received solely as imported technologies.

High-tech cooperation can also expand R&D and strengthen linkages within the innovation ecosystem. The potential for spillover effects depends not only on investment scale but also on how much firms, universities, research institutes, and innovation centers participate in knowledge creation and application. Vietnam has some foundations for such linkages: the Global Innovation Index 2025 ranked Vietnam 31st in university–industry R&D collaboration (WIPO, 2025). The expansion of research, design, and technology development by U.S. technology corporations in Vietnam may add R&D resources, technology platforms, and international knowledge networks, enabling a shift from technology acquisition to research, product co-development, and innovation.

Another opportunity is to strengthen ties between high-tech FDI and domestic firms. The World Bank's Viet Nam 2045: Trading Up in a Changing World report states that foreign firms account for approximately 73% of Vietnam's exports, while the share of domestic firms participating in global supply chains fell from 35% in 2009 to 18% in 2023 (World Bank, 2024). The potential therefore lies not only in attracting high-tech firms but also in developing R&D, supplier, and knowledge linkages between the FDI sector and Vietnamese enterprises. The ability to participate more deeply in value chains depends on the quality of these linkages (Nguyen et al., 2021; OECD, 2026). If expanded, such linkages could increase the potential for technology spillovers from the FDI sector to domestic firms.

Thus, the value of Vietnam–U.S. high-tech and supply chain cooperation for innovation lies not only in investment scale or access to technology, but also in the ability to absorb, apply, and diffuse knowledge within the Vietnamese economy. The findings indicate that Vietnam has established certain foundations in innovation outputs and R&D linkages, but limitations in research personnel, knowledge-intensive employment, and linkages between FDI and domestic firms remain significant bottlenecks. The long-term impact of cooperation therefore depends on Vietnam's ability to connect external technological resources with domestic R&D capabilities, technology firms, startups, and innovation institutions.

3.3.2. Opportunities for Human Resource Development

High-tech and supply chain cooperation with the United States supports human resource development and national objectives in science, technology, and the semiconductor industry. Resolution No. 57-NQ/TW of December 22, 2024, sets a target of 12 R&D personnel per 10,000 people by 2030 and emphasizes developing a highly skilled workforce and gradually mastering strategic fields such as AI, IoT, big data, cloud computing, semiconductors, and quantum technology. Vietnam has set a target to train at least 50,000 university-level or higher-qualified personnel for the semiconductor industry by 2030 and expand the industry's workforce to more than 100,000 engineers and graduates during 2030–2040 (Chinhphu.vn, 2024a). Given persistent shortages of highly skilled workers, cooperation with the United States can expand training capacity and improve quality (Tran et al., 2025; Nguyen & Bui, 2026).

This is particularly evident in the semiconductor sector, where workforce demand is expanding from assembly, packaging, and testing toward integrated circuit design, R&D, software, and systems engineering. Bilateral programs give Vietnamese students, engineers, lecturers, and researchers access to curricula, design tools, and international technical standards. Under the International Technology Security and Innovation Fund (ITSI), Arizona State University (ASU) participates in semiconductor capacity-building programs in Vietnam, including faculty development; skills training in semiconductor assembly, testing, and packaging; and workforce upskilling and reskilling. This approach helps align training with the semiconductor industry.

University–industry linkages provide a channel for improving Vietnam's integrated circuit design workforce. Synopsys is among the U.S. companies engaged in this area by providing design tools, specialized materials, and training programs, and cooperating with universities and localities to train specialized engineers. In March 2024, Synopsys and Vietnam National University Ho Chi Minh City signed an agreement on integrated circuit design training and research. The company's integrated circuit talent training program, launched in 2022, had trained more than 200 students across five cohorts by June 2025, with an average post-training employment rate of approximately 90% (Phạm Vinh, 2025). This shows how university–industry cooperation can bring industrial tools, technical

standards, and occupational requirements into training, narrowing the gap between education and industry needs.

Human resource initiatives have expanded to include digital skills and STEM. Through the Workforce for an Innovation and Start-up Ecosystem (WISE) project, the two countries promoted digital skills training and strengthened links between education and the technology economy. During 2021–2023, the USD 2.2 million WISE project worked with nine private and nonprofit training organizations and supported digital skills training for more than 3,000 students and 500 lecturers from over 60 universities and colleges (U.S. Embassy & Consulate in Vietnam, 2024). WISE demonstrates that bilateral cooperation not only targets specialized personnel in sectors such as semiconductors but also broadens the digital skills base required for the high-tech ecosystem.

The expansion of R&D activities by U.S. companies in Vietnam creates another skills-development channel through participation in research, design, and product development. The semiconductor and AI R&D activities discussed above give Vietnamese engineers, students, and researchers access to tools, processes, and real-world technical environments. This model links skills formation with research and business needs, supporting integrated circuit design engineers, AI specialists, and R&D personnel. The value of cooperation therefore lies not only in the number of people trained, but also in its potential to improve the quality and relevance of skills for knowledge-intensive technological activities.

Bilateral cooperation can support human resource development in two ways: broadening the foundation of digital and STEM skills and developing specialized talent in semiconductors, AI, and R&D. Long-term value depends on aligning training programs, universities, and corporate R&D activities with Vietnam's high-tech development needs. It can therefore provide additional resources to implement the human resource development objectives set out in Resolution No. 57-NQ/TW and the Semiconductor Industry Development Strategy.

3.3.3. Prospects and Conditions for Realizing Opportunities from Cooperation

The prospects for bilateral cooperation in high technology and supply chains reflect the complementarity of the two countries' needs and strengths. The United States seeks to diversify supply chains and expand its network of high-tech partners, while Vietnam requires R&D, capital, knowledge, and a highly skilled workforce to develop strategic industries and improve its position in value chains. Semiconductors, AI, and R&D are therefore likely to remain key areas of cooperation, supported by the CSP and Vietnam's technology development priorities. However, translating opportunities into development outcomes depends on domestic capabilities, the quality of domestic linkages, and institutional and infrastructural foundations.

An important condition is stronger domestic capabilities, including R&D, a highly skilled workforce, and the ability to absorb, adapt, and master advanced knowledge. Vietnam's export model remains concentrated in final assembly, while only about 5% of the manufacturing workforce is considered highly skilled and approximately 10% of the population holds a bachelor's degree (World Bank, 2024). U.S. corporations can generate broader impacts only when Vietnamese firms, universities, and research institutions can absorb and apply knowledge. Alongside workforce development, Vietnam needs to strengthen firms' research and innovation capabilities to move from technology acquisition to adaptation, mastery, and development.

Another condition is stronger links between high-tech FDI and the domestic ecosystem. The presence of international corporations does not automatically produce spillover effects. Studies show that linkages between FDI firms and domestic enterprises are important for global value-chain integration and capturing integration benefits (Nguyen et al., 2021; Hoang et al., 2022). The quality of FDI should also be assessed by its effects on productivity, skills, innovation, and linkages with the domestic sector (OECD, 2026). Developing supplier networks, research cooperation, product co-development, and linkages among firms, universities, and research institutes is important for extending cooperation beyond individual projects to the broader technology and innovation ecosystem.

A further condition is stronger institutional and infrastructural foundations for high-tech development. These activities require digital infrastructure, a stable energy supply, research facilities, intellectual property protection, and a transparent, stable policy environment. Facilitating data flows, strengthening intellectual property protection, investing in STEM and research infrastructure, and promoting university–industry linkages are important for moving toward higher-value-added activities. In cooperation with the United States, these conditions affect not only Vietnam's ability to attract investment but also the quality and technological content of investment flows, particularly in design, R&D, and innovation.

Over the medium to long term, the key prospect for bilateral cooperation lies not in Vietnam becoming an additional production location in supply chain diversification, but in its ability to use this process as leverage to upgrade domestic capabilities. If domestic

capabilities, ecosystem linkages, and institutional and infrastructural foundations improve, cooperation could support three transitions: from attracting high-tech investment to building domestic capabilities; from assembly, packaging, and testing to design, R&D, and innovation; and from advantages based on labor costs to competitive advantages based on knowledge and a highly skilled workforce. Achieving these transitions, rather than increasing project numbers or investment alone, will determine the long-term value of bilateral cooperation in high technology and supply chains.

Conclusion

The study shows that Vietnam-U.S. cooperation in high technology and supply chains during the 2013–2026 period has expanded considerably in both scope and form, particularly since the two countries established the CSP in 2023. Cooperation has gradually developed from investment and production toward design, R&D, and innovation, most notably in semiconductors and AI, while U.S. supply chain diversification has created additional opportunities for Vietnam to participate more deeply in global production and technology networks. Semiconductors illustrate the convergence of these trends, with cooperation extending from assembly, packaging, and testing to integrated circuit design, equipment, R&D, and human resource development.

These developments can strengthen Vietnam's innovation capacity and human resource development by expanding access to technology, knowledge, R&D, and training. However, foreign investment and technology do not automatically translate into domestic technological capabilities. Realizing these opportunities depends on technological absorptive and development capabilities, workforce quality, linkages between the FDI sector and domestic firms and research organizations, and institutional and infrastructural foundations for innovation. The long-term value of cooperation therefore lies in Vietnam's ability to translate these opportunities into domestic technological capabilities, innovation capacity, and a highly skilled workforce, enabling a gradual shift toward more knowledge-intensive and higher-value-added activities

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