ECIPE | EUROPEAN CENTRE FOR INTERNATIONAL POLITICAL ECONOMY

POLICY BRIEF – No. 14/2023

The Imperative of International Cooperation for EU Competitiveness and Resilience in Technology-Driven Industries

By **Matthias Bauer, Renata Zilli,** *and* **Dyuti Pandya**
Director, Researcher, and Research Associate at ECIPE

EXECUTIVE SUMMARY

The EU must embrace international cooperation and collaboration in technology-driven industries to ensure competitiveness and global relevance, while also considering the drawbacks of isolationist policies. The EU's commitment to open markets and global cooperation has historically been its strength, and EU policymakers should continue to prioritise on these principles.

Global markets, international R&D collaboration and global industry-led standards are crucial for innovation and efficiency in technology-intensive industries. Various sectors, including pharmaceuticals, ICT, aerospace, and defence, heavily rely on global partnerships to stay competitive and advance technologically.

International cooperation in economic and security affairs, as exemplified by EU participation in global value chains of advanced semiconductors, the traditional EU approach to industry-led technology standardisation, and EU involvement in the international F-35 fighter development program, is critical for leveraging industry expertise, sharing technological advancements, and collectively addressing challenges in strategic sectors, thereby enhancing Europe's economic resilience and security capabilities.

Trust and legal certainty form the foundation for international partnerships in high-tech and defence sectors. Collaborations among like-minded partners enable secure information sharing, intellectual property protection, financial commitments, and compliance with regulations, while ensuring adherence to key EU values like human rights and the rule of law.

Key Take-aways for EU policymakers:

1. EU policymakers need to embrace international cooperation in technology-driven industries to maintain competitiveness and global relevance.

2. Defensive industrial policies come with high costs and hinder competition and market-driven innovation. The EU and Member State governments need to uphold the EU's commitment to open markets and global cooperation to strengthen Europe's position.

3. Global R&D collaboration is crucial for innovation and efficiency in technology-intensive industries. In an era marked by greater globalisation and technological progress, the EU must intensify its partnerships with global allies in high-tech sectors critical for both the economy and defence.

4. Trust and legal certainty underpin international partnerships in high-tech and defence sectors. Spearheaded by the EU, joint collaborative efforts can nurture a persistent commitment to global collaboration, which is essential for minimising conflicts between nations.

5. The EU should much more actively promote collaboration and regulatory cooperation with trusted international partners to strengthen its own global role and ensure stability within. In a world characterised by continual change and global challenges, such cooperation is pivotal for peace and the reinforcement of international relations.

1. INTRODUCTION

Contemporary EU policy is shaped by the overarching goal of "strategic autonomy," which encompasses various aspects of the economy, security, and defence. However, this concept continues to remain vague, lacking clarity regarding its objectives, scope, proportionality, and necessary limitations in interventions related to production, trade, and investment relations.[1] Since the von der Leyen Commission's inauguration in 2019, EU policymakers have launched extensive industrial policy initiatives, with new impetus provided by the European Commission's "Economic Security" strategy from June 2023[2], and the non-paper "ResilientEU2030" by the Spanish Presidency of the Council of the European Union, proposing a comprehensive, balanced, and forward-looking approach to ensure the EU's Open Strategic Autonomy and global leadership by 2030.[3]

These and previous EU initiatives primarily seek to reduce economic and technological dependencies on third countries. To address asymmetric dependencies, the "ResilientEU20203" report recommends the EU and its Member States to adopt targeted approaches based on thorough sector analysis, considering global industrial collaboration and the benefits of international specialisation. While this appears to be a sensible approach, and the EU is dedicated to maintaining proportionality in its future actions, there remains the risks that the EU might enact measures that could result in restrictions to international trade, foreign investments, and the participation of foreign suppliers in EU markets. After all, several recent EU initiatives have eroded market principles and the commitment to open markets, leading to tensions in international economic relations and disputes with trade and security allies.[4]

The political discourse about EU autonomy and technological sovereignty often conveys the notion that Europe's global economic strength, security, and geopolitical clout were diminishing.[5] It is asserted that Europe's reliance on technological solutions, often sourced from non-EU jurisdictions, necessitated an inward-looking European industrial and regulatory response.[6] What has largely been ignored by advocates of such inward-looking views is the need to actively push for international cooperation among trusted or, as emphasised in the "ResilientEU2030" report, like-minded partners in the setting of industry standards and international collaborations in the development of technologies that can be used for civilian and/or military applications.

---

1 See, e.g., Retter, L., Pezard, S., Flanagan, S., Germanovich, G., Clement, G S., and Paille, P. (2021). European strategic autonomy in defence: Transatlantic visions and implications for NATO, US and EU relations. Rand Corporation. 35. Available at https://www.rand.org/pubs/research_reports/RRA1319-1.html. Also see ECIPE (2022). The costs of the EU's strategic autonomy agenda – Why member states should stop ignoring them. Available at https://ecipe.org/blog/eu-strategic-autonomy-agenda/.

2 European Commission. (2023) President von der Leyen presents the European economic security strategy and the revised multiaxnnual EU budget, press release. 20 June 2023. Available at https://ec.europa.eu/commission/presscorner/detail/en/AC_23_3401.

3 Spanish Presidency of the Council of the European Union (2023). Resilient EU2030: a roadmap for strengthening the EU's resilience and competitiveness. U23. Available at https://futuros.gob.es/sites/default/files/2023-09/RESILIENTEU2030.pdf.

4 An overview of previous initiatives and a taxonomy of measures is provided in ECIPE (2022). The costs of the EU's strategic autonomy agenda – Why member states should stop ignoring them. Available at https://ecipe.org/blog/eu-strategic-autonomy-agenda/.

5 Darnis, J P. (2021) The European Union between strategic autonomy and technological sovereignty: impasses and opportunities. Fondation pour la Recherche Strategiue. Available at https://www.frstrategie.org/sites/default/files/documents/publications/recherches-et-documents/2021/102021.pdf.

6 Business Europe Position Paper (2020) Smart technological sovereignty: How it could support EU competitiveness. Business Europe. Available at https://www.businesseurope.eu/sites/buseur/files/media/position_papers/iaco/2020-06-25_pp_technological_sovereignty.pdf.

Similarly, political calls for maintaining EU values in EU trade and investment policy can carry risks for global cooperation and the international division of labour. While the pursuit of EU values in trade and investment policy is a noble objective, it must be carefully balanced with the need for open and competitive markets and cooperative relations with the rest of the world. These risks encompass potential protectionism, the creation of trade barriers, undermining global collaboration, reduced economic efficiency, geopolitical tensions, and diverging interests within the EU.[7] Striking this balance is essential to prevent unintended negative consequences for global cooperation and the international division of labour.

It is critical for Europe's ability to shape its own economic and technological future that policymakers intensify cooperation with trusted international partners. It is also crucial that Europe does not pursue discriminatory regulatory approaches when setting industrial and technological standards. This paper highlights the importance of international cooperation between companies, on the one hand, and public institutions on the other. We draw attention to the fact that isolationist policies can lead to EU Member States stagnating economically, straining international relationships, and creating social and political isolation.

Considering the above, we argue that the EU must seek to expand cooperation with trusted international partners in high-tech sectors pivotal for both the economy (economic development and structural renewal) and security and defence. International partnerships involving businesses and governmental institutions are indispensable, not only for technological progress and economic prosperity but also for sustaining a long-term interest in international cooperation. An enduring commitment to international collaboration is a fundamental requirement for diminishing international conflicts and ensuring stability in a globally interconnected world.[8] Promoting cooperation at various levels is thus a vital stride towards fortifying the EU's position and geopolitical influence on the global stage and preserving collective peace and rising prosperity.

To underscore the necessity of stepping up EU initiatives for increased global collaboration among trusted partners, including stronger efforts in regulatory cooperation, we provide three noteworthy examples of successful international technology collaboration. These cases hold economic and security (including military defence) significance for Europe, recognising the important roles of businesses from different countries in strategic sectors crucial for bolstering national security via technological advancements. These three cases are:

- EU participation in global value chains of advanced semiconductors,
- the traditional EU approach to industry-led technology standardisation, and
- EU participation in the international F-35 fighter development program.

The paper is organised as follows. Section 2 briefly outlines Europe's strategic aspirations in the context of its economic and technological landscape before outlining major benefits of international cooperation in technology sectors. In Section 3, we showcase three significant

[7] Youngs, R. and Ülgen, S. (2022) The European Union's Competitive Globalism. Carnegie Europe. Available at https://carnegieeurope.eu/2022/02/17/european-union-s-competitive-globalism-pub-86329.

[8] World Economic Forum (2021) Principles for Strengthening Global Cooperation. Available at https://www3.weforum.org/docs/WEF_Global_Action_Group_Principles_2021.pdf.

instances of successful international collaboration in areas critical to global technology development, which have turned out to be vital for Europe from a technological and security perspective. Section 4 concludes by advocating an EU approach to economic and technology policymaking that recognises the benefits of international interdependencies and the role of industry-led collaboration and specialisation, particularly in critical technology-intensive sectors.

2. INTERNATIONAL COOPERATION AND SPECIALISATION

Technology-driven industries are inherently global industries. EU policymakers thus need to recognise the benefits of international cooperation and specialisation along value chains and actively promote collaborative efforts among trusted partners, both within the EU and with international partners in non-EU jurisdictions. Embracing global economic and technological interdependencies is essential for the EU to maintain its competitiveness, ensure economic growth, and bolster its role in shaping the future of technology-driven industries.

In the discourse on strategic autonomy, a common political notion is the need for the EU to bolster its domestic production capabilities and stimulate investments in the research and development of technology-intensive industries. However, many initiatives aligned with this approach have pursued "defensive" industrial policy goals, aiming to either bolster EU-based production or shield EU industries from foreign competition, often relying on government support measures to achieve these objectives. This has resulted in policies such as costly industrial subsidies[9], discriminatory competition regulations[10] as well as proposals for investment screening requirements[11], and exclusionary EU cloud cybersecurity rules.[12]

The drawback of such policies is their typically high associated costs. Industrial subsidies, for instance, demand significant resources that could otherwise be allocated to critical government activities like housing, healthcare, and social welfare programs. Moreover, these policies tend to encourage political rent-seeking, limit healthy competition, and hinder market-driven innovation and entrepreneurship (known as the crowding out effect). The same limitations apply to new laws that favour domestic providers through regulatory design, as exemplified by recent measures like the Digital Markets Act (DMA)[13], the proposed EU digital services tax, and

---

9 European Investment Bank (2023). EIB Group commits record financing in support of EU energy security and green economy. Available at https://www.eib.org/en/press/all/2023-032-eib-group-commits-record-financing-in-support-of-eu-energy-security-and-green-economy.

10 Peterson Institute (2022). The European Union renews its offensive against US technology firms The European Union renews its offensive against US technology firms. Available at https://www.piie.com/publications/policy-briefs/european-union-renews-its-offensive-against-us-technology-firms.

11 White and Case (2023). Foreign direct investment reviews 2023: Europe. Available at https://www.whitecase.com/insight-our-thinking/foreign-direct-investment-reviews-2023-europe.

12 ECIPE and Frontier Economics (2022). Measuring the Costs of the EU's Approach to Open Strategic Autonomy. Available at https://ecipe.org/wp-content/uploads/2022/11/Strategic-Autonomy-Impacts.pdf. Also see ECIPE (2023). The Economic Impacts of the Proposed EUCS Exclusionary Requirements: Estimates for EU Member States. Available at https://ecipe.org/publications/eucs-immunity-requirements-economic-impacts/?_gl=1*374zf8*_up*MQ..*_ga*MjA0Nzc0MzY2MC4xNjk4NDA3MTA5*_ga_T9CCK5HNCL*MTY5ODQwNzEwOC4xLjAuMTY5ODQwNzEwOC4wLjAuMA.

13 Digital Markets Act. Regulation (EU) 2022/1925 (signed September 14, 2022; entry into force November 1, 2022).

the EUCS cybersecurity certification framework[14], which will effectively privilege domestic providers of regulated products and services, undermining competition, and equal treatment.

A potentially more profound negative impact lies in the symbolic influence and societal consequences of isolationist trade and investment policies. If EU policies increasingly prioritise isolation over economic openness and international economic integration, they will negatively impact the global spirit of market openness and globalisation, reducing governments' willingness to engage in economic diplomacy in support of international economic cooperation.

Adhering to the "spirit of free trade", the EU and, first and foremost, EU trade, competition, and internal market policy, has for a long time emphasised and demonstrated that open markets and the free exchange of goods and services does generate economic benefits for all countries, while isolation, manifested in protectionist measures like tariffs and behind-the-border trade restrictions, undermine economic development through a reduction in global trade and trade conflicts.

The EU's once strong commitment to trade liberalisation and globalisation was based on the recognition that greater interconnectedness and interdependence worldwide can lead to increased prosperity and cultural exchange. Similarly, advocating for international collaboration, both in bilateral and multilateral settings, was based on the recognition that tackling global challenges like climate change (the green transition), pandemics, and conflicts is more effectively addressed through collective endeavours rather than isolationist strategies. Isolation may ultimately erode the inclination of others outside the EU to engage in cooperation and, overall, strain international relations.

The question of whether the EU should pursue strategic autonomy remains a complex and debated issue in European politics. Opponents rightfully contend that an excessive focus on autonomy or autarky will strain relations with traditional allies or hinder economic efficiency.[15] In the context of technology development, value chain resilience, and security, regulatory cooperation can facilitate innovation and technology interoperability, foster cross-border research partnerships, mitigate supply chain risks, and promote sustainability. International cooperation among businesses on the other hand, is essential for enhancing the EU capabilities in critical technology areas, position EU actors as key players across value chains in critical sectors, and ultimately contribute to the advancing of EU ambitions for global technology leadership.

The world's most technology-intensive industries are global because they critically rely on international R&D collaboration, with partners working towards global standards, and global supply chains for inputs and intermediary components. Several technology-intensive industries heavily rely on global R&D activities due to the intricate and rapidly evolving nature of their products and technologies. Notable sectors include pharmaceuticals and biotechnology, where research into drugs, vaccines, and medical treatments entails extensive cooperation among

[14] ENISA (2023). EUCS, a candidate cybersecurity certification scheme for cloud services. Version V1.0.335. August 2023.

[15] Bezamat, F., Fendri, M. and Vejvar, M. (2022) Taking big leaps in value chain resilience: adaptation and transformation. WeForum. https://www.weforum.org/agenda/2022/09/taking-big-leaps-in-value-chain-resilience-adaptation-and-transformation/.

scientists and healthcare professionals worldwide. The ICT industry, covering software, hardware, and emerging technologies, significantly benefits from global R&D with major tech companies establishing global R&D centres to access diverse talent and markets. Telecommunications, aerospace, and defence, automotive, energy, semiconductor manufacturing, consumer electronics, biotech, and clean technology also prioritise global R&D to leverage diverse expertise, resources, and market insights, ensuring they stay competitive and at the forefront of technological advancements. Overall, countless industry cases demonstrate that collaboration on a global scale fosters innovation, reduces development costs, and expedites the introduction of new technologies and products.[16]

International standards are gaining increased significance in the ever-expanding digital global economy. While standardisation is not a new concept, it plays an essential role in regulating a wide range of human activities and guiding the development of products and software. In today's interconnected world, the importance of standards has grown substantially as new technologies emerge. This is particularly evident in the digital realm, where technical infrastructure and novel standards are crucial for ensuring the interoperability of devices. Moreover, amid heightened global competition among major industrialized economies in the tech sector, international collaboration on standards provides a common framework, levelling the playing field and facilitating economic progress on a global scale.

Market-driven or industry-led standards benefit the development and trade of high-technology products by driving innovation and efficiency through the utilisation of industry expertise.[17] Market-led international technology standards thus contribute to the collaborative nature of high-tech industries and support global technological advancements. In the context of enhancing global R&D cooperation, these standards enable interoperability, information sharing, research efficiency, and global integration. They create a common framework that facilitates international collaboration, accelerates research efforts, and promotes the exchange of knowledge and expertise, ultimately driving progress in the high-tech and innovation sectors.

Global R&D and industry cooperation is also of paramount importance in the defence sector, as demonstrated in the development of the F-35 fighter. International collaborations in in the defence industry typically allow for cost sharing, access to diverse expertise, resource sharing, and risk mitigation. These collaborations, exemplified by projects like the F-35 fighter program, foster diplomatic relations, boost local economies, and result in the development of advanced and capable defence systems. Such partnerships can help governments to collectively address complex technological challenges while reducing individual financial burdens, ultimately contributing to enhanced security.

---

[16] For cloud services, for example, an overview of international cooperation with EU industry participation is provided in ECIPE (2023). The Economic Impacts of the Proposed EUCS Exclusionary Requirements: Estimates for EU Member States. Table 1, pp. 26. Available at https://ecipe.org/publications/eucs-immunity-requirements-economic-impacts/?_gl=1*374zf8*_up*MQ..*_ga*MjA0Nzc0MzY2MC4xNjk4NDA3MTA5*_ga_T9CCK5HNCL*MTY5ODQwNzEwOC4xLjAuMTY5ODQwNzEwOC4wLjAuMA.

[17] Bauer, M., Erixon, F., Guinea, O., and Sharma, V. (2023). In Support of Market-Driven Standards. ECIPE. Available at https://ecipe.org/publications/in-support-of-market-driven-standards/.

The role of trust and legal certainty

Trust and legal certainty are certainly the foundational elements for global cooperation among governments, businesses, and private-public partnerships (PPPs) in high-technology areas and the defence sector. Trust and legal certainty provide a framework for secure information sharing, intellectual property protection, resource allocation, dispute resolution, and compliance with regulations, long-term commitments, national security considerations, and political stability, ultimately enabling effective and sustainable international partnerships:

- **Long-term commitment**: Trust and legal certainty provide a foundation for long-term commitments, allowing companies and governments to plan and invest with confidence in the stability of a collaboration.

- **Protection of sensitive information:** Trust allows partner organisations to share classified and sensitive information securely, which is essential for many high-tech and defence projects.

- **Intellectual property rights:** Trust and legal agreements help to establish clear intellectual property rights and address issues such as patent ownership and technology licensing, which prevents disputes and ensures that contributors receive their fair share of the benefits.

- **Financial commitments:** Trust among governments and businesses is crucial to ensure that financial commitments are met, which is essential for large-scale technology and defence projects.

- **Compliance with regulations:** Trust and legal agreements help to ensure that participants comply with national and international laws, such as regulations and export controls related to technology, including dual-use and defence technologies.

- **National security considerations:** Trust and legal agreements are essential to address national security concerns, such as the need to ensure that participation in these projects will not compromise a country's own security or interests.

Considering the above, to excel in technological leadership, it is crucial for the EU and Member State governments, to prioritise the strengthening international collaborations with reliable partners who share a strong commitment to major EU values, such as human rights, the rule of law, and a process of economic development that is embedded in internationally open and competitive markets.

Enhancing international cooperation with trusted and like-minded partners ensures the EU and Member State governments can uphold their commitments to human rights and the rule of law and at the same time contribute to economic and technological leadership. In the following sections, we present three examples of EU participation in technology development

and governance (standards), exemplifying the significance of international cooperation for technological development, encompassing economic and security dimensions.

3. MAJOR CASES OF SUCCESSFUL INTERNATIONAL TECHNOLOGY COOPERATION AND SPECIALISATION

Below we show that major knowledge- and technology-intensive EU industries are deeply embedded in global value chains, whereby collaboration efforts are taking place between businesses and governmental institutions as well as PPPs.

3.1. International Cooperation and Interdependencies in the Semiconductor Industry

The semiconductor industry is part of a global ecosystem with complex supply chains that traverse international boundaries.[18] Part of the complexity in delivery systems can be attributed to the intricacies of the semiconductor value chain; according to some estimates, a typical chip must cross 70 international borders before it can be delivered as a final good,[19] making this chain of production among the most sophisticated in the world. Because of its global nature, the supply chain is exposed to a wide range of potential disruptions. Semiconductor manufacturing could involve more than 500 discrete stages and use as many as 300 inputs sourced globally.[20] A large semiconductor firm could rely on up to 16,000 suppliers.[21] [22]

The semiconductor value chain encompasses multiple stages, from R&D to design, manufacturing, and distribution, often involving various international stakeholders. Companies can specialise in their areas of expertise, pool resources, and participate in collaborative ecosystems. Such cooperation enables them to stay at the forefront of innovation, achieve economies of scale, and maintain competitiveness in the dynamic semiconductor market.

R&D activities are also present throughout the value chain, from improving process efficiency and developing new materials to enforcing safety standards within manufacturing facilities. For instance, producing a chip from a silicon wafer requires this process in cleanrooms and facilities where the air is 10,000 times cleaner than the outside.[23] Conversely, while chip design might not

---

[18] SIA (2022) Fact Book. Available at https://www.semiconductors.org/wp-content/uploads/2022/05/SIA-2022-Factbook_May-2022.pdf.

[19] Ibid.

[20] SIA (2022) Fact Book. Available at https://www.semiconductors.org/wp-content/uploads/2022/05/SIA-2022-Factbook_May-2022.pdf.

[21] European Strategy and Policy Analysis System (ESPAS) (2022) Global Semiconductor Trends and the Future of EU Chip Capabilities. Available at https://espas.eu/files/Global-Semiconductor-Trends-and-the-Future-of-EU-Chip-Capabilities-2022.pdf.

[22] To recognise the complexity of the value chain, it is essential to understand the most elementary thing: what is a semiconductor? Firstly, a conductor is a substance or material that allows electrons (the subatomic particles that create electricity) to move freely from one type of material to another. Then, a semiconductor is a material with an electrical conductivity value between a conductor, such as copper, and another material that acts as an insulator, such as glass. For semiconductor production, silicon is the preferred insulator material. A chip comprises miniaturised devices consisting of transistors, diodes, capacitors, resistors, etc., layered on a thin silicon wafer. See, e.g., Varas, A., Vardarajan, R., Palma, R., Goodrich, J. and Yinug, F. (2021) Strengthening the Global Semiconductor Supply Chain in an Uncertain Era. BCG & Semiconductor Industry Associations. https://www.bcg.com/publications/2021/strengthening-the-global-semiconductor-supply-chain

[23] European Parliament (2022) The EU Chips Act: Securing Europe's supply of semiconductors. Available at https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733596.

require large upfront capital expenditures, it requires large sums of investment for R&D purposes. For example, of the top 5 fabless firms,[24] invested $68 billion in R&D in the five years between 2015 and 2019 or an average of $2.8 billion per firm per year, equivalent to 22% of their revenues.[25]

Breakthroughs in the underlying science take a long time, which is why they are also costly to sustain. Some analysts suggest that incipient research on science and engineering should be considered the first stage of the semiconductor value chain since this stage aims to identify the fundamental materials and chemicals that could bring the next technological leap. Yet, it can take 10 to 15 years from when a new technology application is published in scientific papers to when it is ready for commercialisation.[26]

There are generally four types of companies that are involved in the global process of manufacturing:

1. **Integrated device manufacturers (IDMs):** These companies perform multiple sections from the value chain, involving design, fabrication, and assembly and testing. Examples of EU IDMs: STMicroelectronics (France and Italy), Infineon (Germany), NXP (Dutch) and X-FAB Silicon Foundries (Germany).

2. **Fabless design:** These firms focus on design and outsource fabrication, as well as assembly. Europe's decline from 2% of the market in 2015 to 4% in 2010 is attributable to the sale of several European enterprises and business divisions. CSR, the second biggest European fabless IC provider, was bought by Qualcomm in 1Q15, while Lantiq, the third largest European fabless IC supplier, was acquired by Intel in 2Q15.[27]

3. **Foundries:** These companies address the fabrication needs of fables and IDMs firms. Ten top foundries in 2021 include companies like TMSC (Taiwan), UMC, Samsung (South Korea), SMIC, Hua Hong, Nexchip (China), Tower (Israel). Only TSMC (Taiwan) and Samsung (South Korea) are able to manufacture chips at 5nm, and the global economy relies on Taiwan for 92% of the production of these chips.[28] Examples of EU foundries: STM, NXP, Global Foundries (headquartered in US, owned by state edge investment in UAE, trailing edge foundry in Germany, EU) and United Monolithic Semiconductor.[29]

---

[24] Top 5 fabless firms: Qualcomm, Broadcom, Nvidia, AMD, MediaTek.

[25] Varas, A. et Al. (2021) Strengthening the Global Semiconductor Supply Chain in an Uncertain Era. BCG & Semiconductor Industry Associations. https://www.bcg.com/publications/2021/strengthening-the-global-semiconductor-supply-chain.

[26] Ibid.

[27] Clarke, P. (2017) European Share of fabless chip market halves to 1%. EENews. Available at https://www.eenewseurope.com/en/european-share-of-fabless-chip-market-halves-to-1/-

[28] Hancké, B., & Garcia Calvo, A. (2022). Mister Chips goes to Brussels: On the Pros and Cons of a Semiconductor Policy in the EU. Global Policy, 13(4), 585-593. Available at https://onlinelibrary.wiley.com/doi/full/10.1111/1758-5899.13096.

[29] Ciani, A., & Nardo, M. (2022). The position of the EU in the semiconductor value chain: evidence on trade, foreign acquisitions, and ownership (No. 2022/3). JRC Working Papers in Economics and Finance. Available at https://joint-research-centre.ec.europa.eu/system/files/2022-04/JRC129035.pdf.

4. **Test Companies (OSATs):** Outsourced Semiconductor Assembles and Test (OSATs) provide assembly packaging and test services for both fabless and IDMs. With regards to the EU firms, Amkor Technology and GlobalFoundries have formed a strategic partnership to provide At-scale Semiconductor Test & Assembly Services in Europe.

Europe's role in the global semiconductor value chain

In 2021, the European semiconductor market achieved a total volume of some $48 billion which represents a 27% increase from the preceding year.[30] Although Europe possesses certain chip production capacities, and EU companies are well positioned in several segments of the production chain, no European company is among the top ten largest chip makers in the world. At the same time, Europe occupies a critical role in the supply chain as a provider of chemicals.[31] Also, the Dutch company ASML is the sole provider of the latest generation of photolithography scanner equipment (extreme ultraviolet, or EUV, lithography machines).

European companies are competitive in crucial segments of the value chain such as the development and production of state-of-the-art manufacturing equipment, leading-edge logic chips, IP and R&D in semiconductors[32] and the supply of chemicals.[33] European foundries include Global Foundries, STMicroelectronics, Bosch, Infineon, and NXP. However, they have a small share of global production capacities estimated at 10% of global production. Correspondingly, the EU has a relative lack of capacities in design, design automation tools, and all the software used for designing a chip.[34] Similarly, the share of European companies in global fabrication capacity is below 20% for advanced technologies.[35]

As concerns demand for chipsets, the semiconductor industry stands at the heart of Europe's digital and green transition. Microchips are enablers of different technological appliances that shape European's daily lives. While semiconductors will continue to play a dominant role in the development of emerging technologies such as generative AI, 5G/6G networks, quantum computing, etc., their technology is fundamental to everyday applications such as using home appliances or vehicles that transport people to get their jobs. Moreover, the semiconductor industry is also responsible for providing jobs. In 2018, 219,000 Europeans were employed in the manufacturing of electronic components, other 455,000 high-skilled jobs were directly responsible for the microelectronics sector — including design, materials, and production of components. In addition, since semiconductors are enablers of other technologies, they also

---

30 Council of the European Union (2022) The semiconductor ecosystem: Global features and Europe's position. Available at https://www.consilium.europa.eu/media/58112/220712-the-semiconductor-ecosystem-global-features-and-europe-s-position.pdf.

31 Council of the European Union (2022) The semiconductor ecosystem: Global features and Europe's position. Available at https://www.consilium.europa.eu/media/58112/220712-the-semiconductor-ecosystem-global-features-and-europe-s-position.pdf.

32 European Parliament (2022) The EU Chips Act: Securing Europe's supply of semiconductors. Available at https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733596.

33 Thadani, A. and Allen, G. (2023) Mapping the Semiconductor Supply Chain: The Critical Role of the Indo-Pacific Region. Center for Strategic & International Studies. CSIS Available at https://www.csis.org/analysis/mapping-semiconductor-supply-chain-critical-role-indo-pacific-region.

34 European Parliament (2022) The EU Chips Act: Securing Europe's supply of semiconductors. Available at https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733596.

35 Ibid.

account for another 2.6 million jobs across Europe.[36] The development and production of semiconductor components in the EU is concentrated mainly in Germany, France, Italy, the Netherlands, Austria, Belgium, and Ireland.[37] Most of the demand for semiconductors in Europe is driven mainly by the automotive sector (37%), followed by industrial use (25%), communications (15%) and entertainment (14%).[38]

The competitiveness of businesses in Europe will depend on securing access to the most advanced chips. However, there are many constraints that makes the scale of semiconductor production in Europe quite challenging, such as the fragmentation of the industry, the increasing market concentration per region and, access to critical raw materials. On top of that, the war in Ukraine could hamper the supply of neon, a key gas used in chip lithography since approximately half of the global supply of neon was provided by two Ukrainian firms in Mariupol and Odessa.[39]

Global interdependencies have been advantageous for the EU, promoting cross-border collaboration, investments in innovation, and access to major inputs and chipsets from diverse regions. While it is true that complex supply chains can expose vulnerabilities, they also encourage cooperation among corporations, leading to the development of advanced technologies. At the same time, the global interconnectedness of the semiconductor industry makes it challenging for any single country, including China and the US, to dominate the industry, thereby mitigating the risk of geopolitical conflicts that could disrupt the semiconductor supply chain.

To sum up, EU businesses operating in the semiconductor industry have made substantial investments R&D and production capacities, both within the EU and globally. At the same time, access to global supply of intermediate inputs and advanced chipset will remain pivotal for the EU to retain its competitive edge and innovation prowess in the semiconductor industry and to satisfy a rising demand for chips in downstream industries. Achieving a leading position in the semiconductor industry is a challenging goal for the EU. By embracing global cooperation among businesses and research organisations, the EU and its Member State governments can effectively mitigate the risk of supply chain disruptions, maintain access to technological capabilities, and potentially even enhance the position European companies as key players in the semiconductor industry. Taking into account industry trends and patterns and the role of semiconductors in generating value in down-stream industries, global collaborations will remain instrumental in advancing the EU's ambitions for global technology leadership.

---

[36] European Parliament (2022) The EU Chips Act: Securing Europe's supply of semiconductors. Available at https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733596.

[37] Ibid.

[38] Council of the European Union (2022) The semiconductor ecosystem: Global features and Europe's position. Available at https://www.consilium.europa.eu/media/58112/220712-the-semiconductor-ecosystem-global-features-and-europe-s-position.pdf.

[39] European Parliament (2022) The EU Chips Act: Securing Europe's supply of semiconductors. Available at https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)733596.

3.2. International Cooperation on Technical Standards

The significance of global technology standards in today's digital and technology-driven global economy cannot be overstated. Standards have long been essential in regulating and modelling various economic activities. They establish the conditions under which products and services can be effectively delivered. In an era where the world's markets are increasingly interconnected, and new technologies continue to emerge, the role of standards takes on a new level of importance and relevance. This is particularly evident in the realm of digital technology, where the interoperability of devices necessitates the development of novel standards. Moreover, as global technological competition intensifies, international collaboration on standards serves as common ground, levelling the playing field for economic actors and contributing to global economic welfare.

Technical standards, once the domain of engineers, have now become a focal point in international politics as various powers vie for control over standard setting for emerging technologies. This trend is driven by the recognition that standards form the foundation of future industries, including augmented and virtual reality, smart cities, healthcare, and national security, as they will govern the technologies used in defence products and services. China has made a significant push to establish itself as a dominant force in standard setting with its "China Standards 2035" strategy.[40] The EU and the US are also active participants in this race for global technical standards, as demonstrated by the EU-US Trade and Technology Council (TTC) and their working group on "Technology Standards."[41] While China's influence in standards is growing, EU and US companies continue to be the primary drivers behind new technological standards.[42] However, the rise of China in the standards landscape may cause geopolitical challenges, particularly related to exerting political control over standards.

In response to these challenges, the EU unveiled its new Standardisation Strategy in 2022.[43] The initiative takes a rather defensive stance on technical standards, leveraging European standards and European Standardisation Organisations (ESOs) to further Europe's industrial and technological interest. The most radical aspect of the strategy is a regulatory change by which it grants National Standardisation Organisations (NSOs) the last word in the acceptance of standardisation requests, and the adoption, revision, and withdrawal of European standards.

Standards, as defined by the International Organization for Standardisation (ISO), are documents that provide requirements, guidelines, specifications, or characteristics for ensuring that materials,

---

[40] Originating Source from Xinhua News Agency. (2021). The Central Committee of the Communist Party of China and the State Council issued the "National Standardization Development Outline" Gov.cn. 10 October 2021. Available at https://www.gov.cn/zhengce/2021-10/10/content_5641727.htm ; also see: Sheehan, M., Blumenthal, M., and Nelson, M R., (2021). Search Global Resources: Three Takeaways From China's New Standards Strategy. Available at https://carnegieendowment.org/2021/10/28/three-takeaways-from-china-s-new-standards-strategy-pub-85678.

[41] U.S.-EU Joint Statement of the Trade and Technology Council. 16 May 2022. Paris-Saclay, France.

[42] Beattie, A. (2019). Technology: how the US, EU and China compete to set industry standards. Financial Times. https://www.ft.com/content/0c91b884-92bb-11e9-aea1-2b1d33ac3271.

[43] European Commission (2022). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. An EU Strategy on Standardisation Setting global standards in support of a resilient, green and digital EU single market. COM (2022) 31 Final. Retrieved from https://eur-lex.europa.eu/legal-content/ EN/TXT/?uri=CELEX%3A52022DC0031.

products, processes, and services are fit for their intended purpose.[44] They permeate various fields, from communication systems and IT to healthcare, the environment, and food safety. While many standards are voluntary, they often serve as competitive advantages that improve the quality of products and services. In critical sectors like health and safety, standards are more rigorously enforced through regulations that guarantee the safety, quality, and effectiveness of activities. Therefore, while technical standards may be voluntary, compliance with regulations is legally mandatory, and governments can make a technical standard obligatory by referencing it in the law or regulation. For example, in the EU, the ESOs produce technical standards at the request of the EU Commission.[45]

For companies and consumers, the benefits of international standardisation are numerous. Standards not only contribute to brand reputation and equity, signalling product quality, but they also enhance consumer experiences and incentivize competitive practices. For many market economies, developing standards is a voluntary measure between industry stakeholders, which benefits the entire sector by ensuring uniformity of practices.

Technical standards also play a pivotal role in the global economy and its productive structure, fostering innovation, economies of scale, and cost reductions along the supply chain. International standards also promote cross-border trade by harmonising technology interoperability and establishing a common technical language for foreign markets. Technical standards can contribute to the creation of economic growth because they drive up innovation, develop economies of scale and reduce costs along the supply chain. Additionally, international standards also contribute to higher levels of growth because they facilitate cross-border trade by harmonising the interoperability of technology while setting a common technical language between foreign markets. Some concrete examples of how standards contribute to economic growth:

- **Innovation:** Standards are key for innovation and developing future technology. They foster innovation by providing a common language that facilitates interoperability between devices, companies and other economic actors. As a result, standards create ecosystems that facilitate innovation through the development of economies of scale, resulting in valuable returns on investment. Consequently, standards become enablers of economic infrastructure that contributes to increasing levels of growth. Ultimately, the process of standardisation is to maximise the efficiency of economic activity.[46]

- **Cost Reduction:** Adherence to standards can lead to cost reductions in various ways. Standards provide a structured framework for performing tasks and processes. When businesses follow standardised procedures, they can streamline

---

[44] Seaman, J. and Kratz, A. (2023) Strengthening US-EU Cooperation on Technical Standards in an Era of Strategic Cooperation. German Marshall Fund. Policy Brief. 3-16. Available at https://www.gmfus.org/news/strengthening-us-eu-cooperation-technical-standards-era-strategic-competition.

[45] Bauer, M. et al (2023) In Support of Market-Driven Standards. ECIPE. Occasional Paper No. 1. Available at https://ecipe.org/publications/in-support-of-market-driven-standards/.

[46] Tassey, G. (2017) The roles and Impacts of Technical Standards on Economic Growth and Implications for Innovation Policy. Annals of Science and Technology Policy, 1(3), 215-316 DOI: 10.1561/110.00000003.

their operations, eliminate unnecessary steps, and reduce the likelihood of errors and inefficiencies. This improved efficiency translates into cost savings through reduced labour, time, and resource requirements. For instance, standards could simplify training and onboarding processes. When employees are trained to follow standardised procedures they can become proficient more quickly, and perform their activities more efficiently.

- **Risk Mitigation:** Standards help mitigate risks associated with various aspects of business operations, including safety, environmental impact, and cybersecurity. Reducing risks protects businesses from costly disruptions, which can lead to increased investment and growth. By adhering to these standards, businesses can reduce the likelihood of accidents, product recalls, and legal liabilities. The costs associated with such incidents can be substantial, making standards an important tool for risk reduction and cost containment.

- **International Trade:** International standards promote stronger trade activity because they facilitate the exchange of information. In fact, research on the impact of standards in Global Value Chains (GVCs) in intra-EU and extra-EU trade shows that international technical standards reduce information asymmetries between different market actors in Europe. Conversely, when national standards are developed in one country these could become detrimental to trade. Foreign actors would need to adapt and duplicate their own processes, which raises the costs of compliance and adaptation. For some SMEs, engaging in these foreign markets could become prohibitive. While it is necessary that some standardisation process takes place at a domestic or regional level to reflect the cultural idiosyncrasies according to the local domain, national standards raise the stakes to develop open and competitive markets. Some national market players can utilise these structural advantages to gain leverage over their international peers which hinders competitiveness and contributes to market fragmentation. In the specific case of the EU, even though these standards are publicly available if they are only published in the local language, they can become a technical barrier to trade. When comparing national standards versus international standards, the latter was to find a positive effect on trade to developing nations' exports to the EU.[47]

The EU's standardisation system has delivered economic benefits for European firms and consumers over the years. However, there are concerns about changes introduced by the EU's new Standardisation Strategy from 2022, which may shift more decision-making power to National Standardisation Authorities, e.g., through increased control over committee membership.[48] The strategy's attempt to gain more control over technical standards carries a risk of undermining its own goals. The primary motivation behind this strategy is the perception that the current process favours non-EU multinational companies in standardisation decisions. To address this,

[47] Blind, K. Mangelsdorf, A. Niebel, C. & Ramel, F. (2018) Standards in the global value chains of the European Single Market. Review of International Political Economy, 25(1) 28-48, DOI:10.1080/09692290.2017.1402804.

[48] European Commission (2022). (See note: 47)) 31 Final. Retrieved from https://eur-lex.europa.eu/legal-content/ EN/ TXT/?uri=CELEX%3A52022DC0031.

EU National Standardisation Bodies could gain more powers over standardisation requests and the adoption, revision, and withdrawal of European technical standards. These changes are particularly significant for ETSI, Europe's Standardisation Body in charge of telecommunication standards and one of Europe's most successful organisations. ETSI is a prime example of EU normative power since it hosts companies from more than 60 countries, while retaining a large membership of EU firms.[49]

While these changes aim to modernise the governance system, they bring potential risks that could undermine international cooperation. It is imperative for EU policymakers to recognise the importance of international technical standards for Europe's economic growth and global influence. The success of the European standardisation system, which is market-driven and based on consensus, has had significant economic benefits in the development of specific industries, like the European Information and Communication Technologies (ICT). Technical standards in ICT have shaped a European industry that is not only dynamic and international but also enjoys some of the highest levels of wages and Research and Development spending.

If technical standards are not developed through an open, consensus-based, and industry-led voluntary process, they will be developed in different ways. For instance, governments and (market-dominating) companies can develop standards by themselves. Both solutions are inferior to the current market-driven approach that governs European standards. EU policymakers should thus continue to prioritise international and industry-led cooperation in the development of technical standards, maintaining a market-driven consensus model with a strong regulatory framework. Collaboration with major players, especially trusted or like-minded partners from, for example, OECD countries, is essential to prevent standards fragmentation, promote international trade, and ensure open and competitive global markets, ultimately benefiting European businesses and citizens.

3.3. The F-35 Joint Strike Fighter and International Cooperation

International cooperation in the development of defence and dual-use technologies is of paramount importance for countries to be able to deploy technological advancements. Collaboration in defence technologies allows countries to harness collective resources, knowledge, and expertise, enabling the development of cutting-edge defence capabilities that would be challenging to achieve individually. As such, international collaborative efforts tend to foster innovation, cost-effectiveness, and efficiency in creating advanced military assets.

The F-35 program, initiated by the US Department of Defense (DoD) and expanded to other countries, exemplifies the significance of international cooperation in this domain. Initially, the Joint Advanced Strike Technology (JAST) program was focused on developing advanced technologies and concepts, but it eventually transitioned to creating the F-35 Joint Strike

[49] Bauer, M. et al (2023) In Support of Market-Driven Standards. ECIPE. Occasional Paper No. 1. Available at https://ecipe.org/publications/in-support-of-market-driven-standards/.

Fighter (JSF).[50] This shift highlights the importance of not just developing technologies but also integrating them into an effective aircraft. The F-35 program represents a ground-breaking arms acquisition effort of the century, a joint endeavour between the Pentagon and Lockheed Martin, one of the world's largest defence contractors.[51]

The uniqueness of the F-35 program lies in its deep interconnectedness with the military air forces of the US and key security allies. It extends to industrial components that unify the capabilities of the global industrial base. This interconnectedness provides an interoperable defence network that strengthens global security. The F-35 program commenced with partners like the Netherlands, Norway, and Denmark, and expanded to include Belgium, Finland, Switzerland, and, notably, Germany following the Russian invasion of Ukraine.[52]

The collaboration between Denmark, Norway, Finland, and Sweden, all of which are becoming F-35 operators, sets the stage for a combined fifth-generation-based fighting alliance.[53] Furthermore, countries like Australia, Japan, the Republic of Korea, and Singapore are also committed to the F-35 program.[54] The Republic of Korea and Singapore however are members of a security partnership and frequently align themselves with the interests of the US. Singapore joined the F-35 program, along with Israel, in a separate category, referred to as "security cooperative participants."[55] This category entails the countries to not possess any industrial participation, but rather just a partnership of buying traditional foreign military sales channels.

The "alliance effect" is a major benefit of the F-35 program. When a government invests in the F-35, it gains access not only to the aircraft but to the entire software and hardware ecosystem surrounding it. This interoperable ecosystem enhances communication, data sharing, and collaborative defence efforts. Moreover, the discussion for the F-35 alliance moving forward will be eventually become more focused on sensors, data, and instantaneous communication, and that very infrastructure seems to be changing how we perceive warfare.[56] The F-35 program is deliberately crafted for strategic purposes. It serves as an exceptionally capable tactical resource that binds the battlefield together and amplifies

---

[50] US DoD (2008) F-35 Lightning ll Joint Strike Fighter (JSF) Program Charter, signed by Gordon England, Deputy Secretary of Defense. Arlington, VA: Department of Defense.

[51] Donnelly, T. and Lohaus, P. (2013) Introduction: A Comprehensive Case for the F-35. American Enterprise Institute, 3-5. Available at http://www.jstor.com/stable/resrep03140.5.

[52] Belgium was among the initial F16 EPAF air forces, while Finland and Switzerland had experience with the twin-engine Boeing F-18 aircraft.

[53] Reuters (2023). Nordic countries plan joint air defence to counter Russian threat. 24 March 2023. Available at. https://www.reuters.com/world/europe/nordic-countries-plan-joint-air-defence-counter-russian-threat-2023-03-24/.

[54] Note: Australia has been a key partner in the F-35 program from the beginning, participating in its development and production. Japan has established its own Final Assembly and Checkout (FACO) facility for F-35s in Nagoya and is involved in the assembly and testing of the aircraft in their country. The Republic of Korea is s preparing to take delivery of F-35s. Singapore, which was one of the original security cooperative participants, is in the process of becoming the fourth operator of the F-35B model. Singapore's interest in the F-35B is due to its unique operational environment, which includes a small territorial size and limited large airports. The F-35B's capability for short takeoff and vertical landing (STOVL) would allow for operations from highways if traditional airports became unusable in a conflict.

[55] Burbage, T., Clark, B., Pitman, A. with Poyer, D. (2023) F-35: The Inside Story of the Lightning II. Skyhorse Publishing; The Republic of Korea is now building major assemblies as they prepare to take delivery of their F-35s. Singapore, one of the original security cooperative participants, has begun the process to become the fourth F-35B operator. Singapore also has the unique operational environment of being a territorially minuscule state with essentially no large airports. Their interest in the F-35B model offered the potential to use highways for takeoff and landing in the event the airports were unusable in a conflict.

[56] Leonard, C. (2023, August 2) Lockheed Martin's $1.7 trillion F-35 fighter jet is 10 years late and 80% over budget—and it could be one of the Pentagon's biggest success stories, FORTUNE. https://www.f35.com/f35/news-and-features/F35-Pentagon-success-story.html.

the well-established interoperability, which remains a crucial competitive advantage for the US.[57] And hence it is also responsible for holding America's network of allies and partners by allowing it to act as a component of integrated deterrence. "We are creating … a system for the program to enable freedom of movement of [global spare pool] items to support the F-35 anywhere in the world."[58]

The program's interoperability is demonstrated through its use in NATO missions, such as Baltic Air Policing, showcasing the benefits of standardized equipment.[59] The spreading of production across different countries broadens the consumer base for the F-35, promoting economies of scale and standardisation, which simplifies logistical processes and reduces the burden on individual nations. While the benefits of the F-35 program are evident, it is not without its challenges and uncertainties. Issues related to work shares, technology transfer, and cost overruns[60] have strained the cooperation between the US DoD and foreign partners. There is also a requirement to establish a more robust and resilient supply chain to guarantee the military's ability to sustain flying operations in the future.[61] Numerous significant technical inadequacies appear to exist, yet the specific nature of these issues remains undisclosed to the general public. A F-35 JPO spokeswoman also said, "Details of [deficiencies] — even unclassified [deficiencies] — are not publicly releasable because the information is operationally sensitive, and its release could be detrimental to U.S. and international war fighters operating F-35s worldwide."[62] A report has highlighted that the F-35 falls short of meeting its combat readiness objectives and lags behind the performance levels achieved in 2022.[63] Moreover, the rapid modernisation of the Chinese military poses a significant challenge to the F-35's role in the evolving global security landscape.[64]

From the perspective of European governments, the fundamental political and military objective of the JSF program is to guarantee the interoperability of their respective national aircraft fleets on a transatlantic scale, encompassing logistical aspects. This necessitates a thorough understanding of the aircraft's potential applications and the highest degree of similarity among its various versions, as well as between the aircraft of diverse nations. For instance during a discussion at the Atlantic Council, Air Force Gen. Tod Wolters, who also

---

57 Gen. Brown Jr. CQ (2021, December 6). US Air Force chief: Interoperability is key to winning future wars. Defense News. https://www.defensenews.com/outlook/2021/12/06/us-air-force-chief-interoperability-is-key-to-winning-future-wars/.

58 Schroder, R. Dehner, M and Siders R. (2022, May 7) Why the Future of the F-35 Program Is Actually About 'Integrated Deterrence' Real Clear Defense. Availbale az https://www.realcleardefense.com/articles/2022/05/07/why_the_future_of_the_f-35_program_is_actually_about_integrated_deterrence_831157.html#.

59 Nostrant, R. (2022, March 4). US F-35s and allies conduct air policing operations out of Baltic countries. AirForce Times. https://www.airforcetimes.com/news/your-air-force/2022/03/03/us-f-35s-and-allies-conduct-air-policing-operations-out-of-baltic-countries/.

60 GAO. (2023, September 21). F-35 Aircraft: DOD and the Military Services Need to Reassess the Future Sustainment Strategy. GAO-23-105341. https://www.gao.gov/products/gao-23-105341.

61 Losey, S. (2021, April 4) 'Just in time' F-35 supply chain too risky for next war, general says. DefenseNews. https://www.defensenews.com/newsletters/2023/04/03/just-in-time-f-35-supply-chain-too-risky-for-next-war-general-says/.

62 Insinna, V. (2021, July 16) The number of major F-35 flaws is shrinking, but the Pentagon is keeping details of the problems under wraps. DefenseNews. https://www.defensenews.com/smr/hidden-troubles-f35/2021/07/16/the-number-of-major-f-35-flaws-is-shrinking-but-the-pentagon-is-keeping-details-of-the-problems-under-wraps/.

63 Congressional Budget Office. (2023). Availability and Use of F-35 Fighter Aircraft: An Update. Available at https://www.cbo.gov/publication/58942.

64 Horowitz, M C. and Kahn, L., (2021, November 4) DoD's 2021 China Military Power Report: How Advances in AI and Emerging Technologies Will Shape China's Military. CFR. Available at https://www.cfr.org/blog/dods-2021-china-military-power-report-how-advances-ai-and-emerging-technologies-will-shape.

serves as NATO's Supreme Allied Commander for Europe, mentioned that the coalition is actively enhancing its capabilities in fifth-generation fighter aircraft.[65]

International cooperation in defence technology development among trusted partners has become pivotal for achieving advanced technological capabilities, cost-effectiveness, and global security. The F-35 program exemplifies the benefits and challenges associated with such collaborations, emphasising the need for trust, interoperability, and adaptability in the ever-evolving landscape of defence technologies. To continue benefiting from global advancements in this field, the EU and its Member States should prioritise strengthening their collaborative efforts, maintaining trust, and addressing challenges proactively.

4. CONCLUSION

It is critical for Europe's ability to shape its own economic and technological future European policymakers cooperate with others, and allow European companies to collaborate with partners at a global level. For any country or a regional entity such as the EU, the ability to exert influence on others, in other words, to possess effective sovereignty, relies significantly on strategies and actions that mobilise the creativity and efforts of numerous actors. This same principle applies to technology policy and leadership: Europe's potential to succeed in the realm of technology stems from the capacity of individuals, businesses, and governments to harness cutting-edge technologies in diverse and innovative ways.

The EU can significantly benefit from increased cooperation with international partners in high-tech areas that are of great importance for both the economy and defence. Cooperation not only between companies, but also between public institutions should be more actively promoted. Collaborations with trusted or like-minded partners are crucial because they not only enable technological advances and economic success, but also maintain long-term interest in international collaboration. This is a fundamental requirement for minimising interstate conflicts and ensuring stability in a globalised world. Promoting cooperation at different levels is therefore an essential step in strengthening the role of the EU in the international arena and securing common peace.

The semiconductor industry is a point in case. Industry data shows that the EU is deeply engaged in global value chains and international cooperation spanning the semiconductor industry, technical standards, and defence technology development. These collaborations offer significant advantages, albeit with associated challenges, and are integral to the EU's economic growth, technological leadership, and security. In the semiconductor sector, the EU holds a pivotal position, particularly in chemicals supply and advanced manufacturing equipment. Nevertheless, chip design and software development pose challenges. To preserve its competitiveness and access to cutting edge technology solutions, the EU should make sure that European suppliers and users of semiconductors have unrestricted access to inputs and technologies that are provided globally.

---

[65] U.S. and other NATO allies could have 450 F-35 Joint Strike Fighters stationed in Europe by 2030; Losey, S. (2021, June 10) There Will Be 450 F-35s in Europe by 2030, NATO Commander Says. Military.com. Available at https://www.military.com/daily-news/2021/06/10/there-will-be-450-f-35s-europe-2030-nato-commander-says.html.

International collaboration on technical standards is fundamental for a globally connected economy, driving innovation, cost-efficiency, risk mitigation, and international trade. The EU should maintain its focus on industry-led and international cooperation for standards development, ensuring a market-driven and consensus-based approach. It should also work closely with trusted international partners to prevent standards fragmentation.

In defence technology, international cooperation is indispensable for achieving advanced capabilities, cost-effectiveness, and global security. The F-35 Joint Strike Fighter program exemplifies the benefits and challenges of such partnerships. European governments should prioritise cooperation with trusted partners to continue reaping the rewards of global advancements in this domain.

The EU should seek to intensify international cooperation in tech industries, prioritising open markets and global collaboration rather than pushing for isolationist policies. Global R&D collaboration and industry standards are essential for innovation and efficiency, particularly in sectors like pharmaceuticals, ICT, aerospace, and defence. Trust and legal certainty are fundamental for international partnerships in high-tech and defence, ensuring secure information sharing, IP protection, financial commitments, and regulatory compliance while upholding EU values.

The EU should take a more proactive stance in advocating for collaboration and regulatory cooperation with reliable economic and security allies to enhance its own global influence and contribute to global stability. In a world marked by changing geopolitical powers, cooperation with like-minded democracies plays a critical role in fostering peace and fortifying international relations.