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**Caroline Giusti de Araújo  
Valeria Silva Mortari  
Antônio Carlos Diegues**

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**ie** Instituto de  
economia

# Recent evolution of industrial policy: a comparison across China, the European Union, and the United States of America (2020-2025)

Caroline Giusti de Araújo<sup>1</sup>

Valeria Silva Mortari<sup>2</sup>

Antônio Carlos Diegues<sup>3</sup>

## Abstract

This article provides a comparative analysis of industrial policy agendas in China, the European Union, and the United States between 2020 and 2025, examining whether their recent convergence signals a shared development model or the adaptation of industrial policy to distinct positions within the global productive and technological hierarchy. The analysis combines a bibliometric approach to the academic literature with a comparison structured around strategic agendas, industrial policy instruments, and prioritized sectors. The findings indicate convergence in narratives, instruments, and targeted sectors, particularly around strategic autonomy, productive resilience, and the green and digital transition. However, industrial policy performs distinct structural functions across the three cases: upgrading and consolidating China's position in global value chains, defending and reorganizing technological leadership in the United States, and preserving competitiveness and strategic autonomy in the European Union under institutional constraints.

**Keywords:** Industrial policy; China; European Union; United States.

## Resumo

### *Evolução recente da política industrial: uma comparação entre China, Estados Unidos da América e União Europeia (2020-2025)*

Este artigo analisa comparativamente as agendas de política industrial da China, da União Europeia e dos Estados Unidos entre 2020 e 2025, investigando se a convergência recente dessas agendas indica um modelo comum de desenvolvimento ou a adaptação da política industrial a posições distintas na hierarquia produtiva e tecnológica global. A análise combina uma abordagem bibliométrica da literatura acadêmica com uma comparação estruturada em torno de agendas estratégicas, instrumentos de política industrial e setores prioritários. Os resultados indicam convergência em narrativas, instrumentos e setores, especialmente em torno da autonomia estratégica, da resiliência produtiva e da transição verde e digital. Contudo, a política industrial desempenha funções estruturais distintas: elevação e consolidação da posição chinesa nas cadeias globais de valor, defesa e reorganização da liderança tecnológica nos Estados Unidos e preservação da competitividade e da autonomia estratégica na União Europeia sob restrições institucionais.

**Palavras-chave:** Política Industrial; China; União Europeia; Estados Unidos.

**Código JEL:** L5; O14.

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(1) Industrial Specialist at *E+ Energy Transition*. Ph.D in Science and Technology Policy, State University of Campinas (IG/Unicamp), Campinas, Brazil. E-mail: [carolgiustiaraujo@gmail.com](mailto:carolgiustiaraujo@gmail.com). ORCID: <https://orcid.org/0000-0002-7712-1092>.

(2) Professor at Federal University of Grande Dourados (UFGD). Ph.D in Economic Development at Federal University of Paraná (UFPR). E-mail: [mortarivaleria@gmail.com](mailto:mortarivaleria@gmail.com). ORCID: <https://orcid.org/0000-0003-3798-5563>.

(3) Associate Professor at State University of Campinas – Unicamp, Institute of Economics. Director Center for Industrial Economy and Technology. Ph.D in Economics at Unicamp. E-mail: [diegues@unicamp.br](mailto:diegues@unicamp.br). ORCID: <https://orcid.org/0000-0002-4124-666X>.

## 1 Introduction

The purpose of this paper is twofold. First, it seeks to identify and compare the patterns of industrial policy initiatives undertaken by the European Union (EU), China, and the United States since 2020, as well as to examine the main academic and interpretative trends associated with this renewed policy agenda. Second, the paper proposes an analytical lens for the comparative interpretation of these processes, aimed at assessing whether the apparent convergence in contemporary industrial policy discourse reflects a shared logic of structural transformation or conceals fundamentally different institutional and developmental trajectories.

Empirically, the analysis draws on the construction of publication networks and clusters associated with industrial policy. Analytically, and based on both these networks and the most recent policy plans of the EU, the United States, and China, the paper structures its assessment around three components: the strategic agenda, industrial policy instruments, and targeted value chains and strategic sectors.

The explicit revival of industrial policy in recent years has been driven by a set of crises that have challenged the political, economic, and institutional foundations upon which the post–World War II international order was built. This order—anchored in the consolidation of U.S. hegemony and in the internationalization of institutions typical of Western liberal democracies—rested on the assumption that market liberalization (in its productive, technological, commercial, and financial dimensions) was the *causa causans* of economic development.

Based on a framework that draws on the idea of long-run convergence in development levels across nations (Ricardo, 1891; Acemoglu & Robinson, 2008), the international order was constructed around the universalization of access to global markets for goods and services and the standardization of institutions. Its intrinsic purpose was to limit the ability of discretionary policies to influence resource (mis)allocation within national economies. Under the constraints and guidelines imposed by organizations such as the WTO and agreements such as TRIMs (Trade-Related Investment Measures), TRIPS (Trade-Related Aspects of Intellectual Property Rights), and the SCM Agreement (Subsidies and Countervailing Measures), it was assumed that the conditions for what Amsden (1989) and Chang (2003) describe as “correct prices” and “appropriate institutions” would be generalized across nations. The prevalence of these prices and institutions was regarded as a fundamental condition for sustaining national development trajectories.

Since the 2008 Great Financial Crisis, however—and notably even within high-income economies—growing doubts have emerged regarding the capacity of this institutional and policy architecture to deliver improvements in living standards, reduce social heterogeneity, or foster the green transition *solely* through the free operation of market forces.

In parallel, the intensification of geopolitical rivalry, the post-pandemic demand for greater resilience in global value chains, and the escalating techno-nationalist tensions between the United States and China have revealed a series of challenges that highlight the limitations of the prevailing political, economic, and institutional order.

It is precisely in response to these challenges that industrial policy has regained prominence in both high-income and middle-income countries. Against this backdrop, the present paper offers a comparative analysis of the industrial policy debate in the United States, the European Union, and

China between 2020 and 2025. The goal is to identify the empirical patterns of national initiatives and to understand how these patterns relate—albeit in distinct ways—to the challenges mentioned above. The analysis is organized around three analytical lenses — strategic agendas, industrial policy instruments, and targeted value chains — which together allow us to assess whether apparent convergence in policy discourse corresponds to deeper similarities in development trajectories or different institutional and structural logics.

The paper is organized into four sections, in addition to this introduction. Section 2 provides a brief discussion of the revival of industrial policy. Section 3 outlines the methodological strategy. Section 4 examines industrial policy initiatives in the selected countries. The final section presents the concluding remarks.

## **2 The revival of industrial policy: from literature to practice**

### **2.1 Definitions and concepts: old debates in new bottles**

From a neo-Schumpeterian perspective, industrial policy can be broadly understood as a set of state actions designed to stimulate processes of creative destruction, primarily by promoting technological and innovative learning. Such processes are associated with structural transformation dynamics aimed at fostering dynamic efficiency—both Schumpeterian and Keynesian—with the purpose of enhancing productivity and the competitiveness of the domestic productive structure.

Since the 2008 Great Financial Crisis, the debate on industrial policy has resurfaced forcefully, in both academic and policy circles (Cherif; Hasanov, 2019; Aiginger; Rodrik, 2020; Diegues et al, 2023; Aiginger; Ketels, 2024; Alami et al., 2025). This resurgence follows a long period during which explicit industrial policy measures were widely viewed within public policy debates as inefficient and distortionary, incompatible with the central principles underpinning the international economic order. That institutional order—whose highest expression lies in the drive for economic liberalization, both financial and productive—was seen as the essential mechanism for harmonizing development trajectories across nations (Acemoglu; Robinson, 2008).

The initial revival of industrial policy—often in less explicit forms—rested on a package of measures intended to support economic recovery in the aftermath of the 2008 crisis. In parallel, as sustained growth failed to materialize in several European economies, skepticism increased regarding the ability of a fully liberalized development model to improve living standards for an ever-larger share of the population, including in high-income countries.

Other decisive factors contributed to the early reemergence of industrial policy during the 2010s. First, China’s challenge to Western technological leadership intensified, particularly in sectors emblematic of the emerging techno-economic paradigm conventionally labelled “Industry 4.0” (Diegues; Roselino, 2023). Next, the Covid-19 pandemic and even the war in Ukraine exposed the fragilities of global value chains. The resulting concern with strengthening supply-chain resilience and securing strategic inputs through increasingly domestic production bases brought industrial policy and national sovereignty into closer intersection within economic and political agendas.

Finally—and no less importantly—the growing awareness of the exhaustion of planetary boundaries (Rockström et al., 2009; Mazzucato et al., 2024) has generated an urgent imperative to redesign the foundations of the development model that has prevailed since the First Industrial

Revolution. Consequently, green industrial policies have moved to the forefront of both academic debates and national strategies aimed at long-term development.

Although these drivers are diverse in nature, they share elements that echo the earliest justifications for industrial policy, present since the works of List (1841) and Hamilton (1791). These include: (i) the notion that the configuration of the productive structure critically conditions the feasible long-term development strategies; (ii) recognition of the limits of market signals alone in fostering structural transformation through processes of creative destruction (Cimoli et al., 2009); and (iii) the revival of the view that the international economic system is inherently unstable and hierarchical, marked by intense competition among nations and among their respective productive and technological structures.

Against this backdrop, the recent exponential surge in industrial policy measures (Evenett et al., 2024; Juhász et al., 2024) has intensified debates about the need to build new policies and institutions capable of promoting alternative development paths—even in high-income economies (Kattel et al., 2022). These new configurations (“new bottles”), while shaped by the traditional drivers of industrial policy (“old wine”), must also confront emerging geopolitical, environmental, and social challenges, thereby securing the political legitimacy required for their implementation.

Thus, even though contemporary industrial policy must still engage with issues traditionally associated with geopolitical rivalry (what Nelson, 1977, in his classic essay, calls the “*moon*” side of industrial policy), the complexity of modern societies and pressing environmental and social challenges make it imperative that industrial policies also address the problems of the “*ghetto*” (Nelson, 2011).

## **2.2 Current Industrial Strategy of China, USA and European Union**

This section presents an analysis of the current industrial policy plans and strategies adopted by China, the United States, and the European Union. The aim is to identify, in each case, the strategic orientation guiding these policies, the productive chains, and the instruments mobilized to promote productive modernization, technological autonomy, and competitiveness.

### **2.2.1 China**

When examining recent industrial policy initiatives in China, one feature stands out. These policies operate within a broader, deeply interconnected development strategy anchored in a long-term objective: the Chinese National Rejuvenation. This project aims to build a “moderately prosperous” economy and reposition China at the center of the global economic–political system by 2049. The scale, ambition, and temporal horizon of these goals give Chinese industrial policy a distinctive character.

By the mid-2000s, the magnitude of these ambitions prompted local policymakers to reassess the limits of the prevailing catch-up strategy, centered on joint ventures with multinational firms (Fu, 2008; Naughton, 2021). The *market-for-technology* approach had supported rapid productive learning, GVC integration, and China’s rise as the “Factory of the World.” Yet Party technocrats increasingly viewed it as insufficient for the next stage of development. National Rejuvenation required faster and deeper accumulation of indigenous productive, technological, and innovative

capabilities—beyond what JV-based technology transfer could deliver (Lu; Feng, 2005; Heilmann, 2008; Feng, 2019).

In the years following the mid-2000s, industrial and innovation policies evolved amid what increasingly appeared to be a dual strategic challenge. The first was the middle-income trap. Sustained growth demanded ongoing technological upgrading in industries rooted in the second and third industrial revolutions (Lee, 2021). This upgrading was essential for raising productivity, creating local brands and technologies, and increasing value added and wages.

The second challenge stemmed from the strategic reactions of Germany, Japan and the United States, which sought to push the technological frontier toward the emerging “Industry 4.0” paradigm (Feng et al., 2022). These initiatives aimed to reshape the foundations of international competitiveness and reinforce their technological leadership. By promoting new industries and diffusing general-purpose technologies into traditional sectors, Industry 4.0 threatened to erode China’s existing competitive advantages—advantages built under the previous techno-economic paradigm, such as large-scale production, depreciated exchange rates, relatively low input and labor costs, tax incentives, and state-supported investment through national champion firms (Burlamaqui, 2020).

In light of this dual challenge, *Made in China 2025* (MIC) — launched in 2015 — stands out among the industrial policy initiatives emerging in the early 2010s. Broadly, MIC extends the trajectory set by the *Medium and Long-Term Plan for Science and Technology Development* (MLP, 2006–2020) and by the establishment of the *Strategic Emerging Industries* (SEI) in 2010. These frameworks, centered on innovative learning, set key targets: raising R&D expenditure to 2.5% of GDP, reducing foreign technological dependence to 30% by 2020, and advancing indigenous innovation. They also defined a detailed set of priority sectors and strategic technologies that would guide subsequent industrial policy efforts.

From the continuity across these policy frameworks, a core set of industries consistently promoted by the Chinese state becomes evident. Their pervasiveness and repeated prioritization in all three initiatives underscore their strategic role in advancing National Rejuvenation. This core comprises:

1. **Next-generation information technology and semiconductors** (integrated circuits, artificial intelligence, big data, cloud computing);
2. **Precision and high-end machinery**, including advanced agricultural equipment, smart manufacturing, and cyber-physical systems;
3. **Aerospace and advanced transportation equipment**, including high-speed rail;
4. **Biotechnology and pharmaceuticals**;
5. **New materials**, such as smart materials, high-temperature superconductors, and energy-efficient materials;
6. **New energy and energy-equipment industries**, including electric vehicles.

Regarding policy instruments, the scale of China’s industrial policy objectives immediately draws attention to the magnitude of resources mobilized. According to Kennedy et al. (2022), China’s industrial policy spending is roughly three times that of the United States, 9.5 times that of Japan, and

15.5 times that of Germany. This broad effort materializes in several ways: the establishment of more than forty national R&D centers in specific technologies; the creation of new institutional mandates for State-Owned Enterprises (SOEs) through the formation of *State Capital Investment and Operations Companies* designed to sponsor *Industrial Guidance Funds* targeting strategic sectors; incentives for establishing overseas R&D centers and for using mergers and acquisitions as vehicles for technological learning; the ambition to shape international technological standards in emerging fields; the deployment of lending by major domestic banks as patient capital for national champion firms; and the coordination of SOE investment decisions through the state holding agency SASAC (State-Owned Assets Supervision and Administration Commission), among others.

Taken together, the scope of China's industrial policy and the challenges inherent to middle-income development imply that the country must simultaneously advance institutional and policy transformation (Feng, 2019) toward a paradigm based on endogenous innovation, while ensuring that this shift does not remain confined to GVC-linked, high-technology sectors. The diffusion of productivity gains driven by innovative learning is essential for maintaining competitiveness in lower-tech segments of the domestic production structure. This diffusion is also critical for reducing the structural heterogeneity typical of developing economies, while sustaining rising average wages and improving social welfare among China's population.

### 2.2.2 United States of America (USA)

The Covid-19 constituted an unprecedented event in the contemporary era, both in its magnitude and in the scale of the governmental response mobilized to mitigate its effects. In the United States, the federal government deployed loans, subsidies, and expenditure packages amounting to several trillions of dollars, with the aim of preventing a deeper recession and accelerating economic recovery. These exceptional measures not only underscored the singularity of the crisis and its subsequent rebound, but also contributed to a broader shift in public attitudes regarding the role of the state in the economy, thereby creating political and institutional space for a reconfiguration of industrial policy.

The sharp decline in manufacturing's share of Gross Domestic Product (GDP) since the 1980s provides the historical backdrop for this policy shift. A revision of industrial production statistics for the period 2016–2021—considered the most significant in decades—revealed that the commercial and tax policies implemented during those years failed to stop the sector's contraction. At the same time, the persistence of slow wage growth and rising inequality—phenomena that have intensified over the past forty years—reinforced the perception that state intervention was necessary to address long-standing structural imbalances. The widening divergence between productivity and wages, which have grown at markedly different rates since 1979, became a central source of socioeconomic fragility.

Against this backdrop, the Biden administration introduced the *Build Back Better Agenda*, whose core component, the *American Jobs Plan*, represented a major departure from traditional U.S. economic policy. Estimated at approximately US\$ 2.3 trillion over eight years, the plan proposed massive investments in physical and community infrastructure, research and development, manufacturing, and long-term care services. Its financing strategy included an increase in the corporate tax rate and a revision of the taxation of foreign earnings, under the logic of a "*Made in America Corporate Tax Reform Plan*" (ECLAC, 2022).

The largest share of resources (US\$ 1.3 trillion) was directed toward transportation and community infrastructure. Another US\$ 580 billion supported research, development, and workforce training, while US\$ 400 billion were allocated to home- and community-based care for older adults and persons with disabilities (ECLAC, 2022). The plan therefore went beyond traditional infrastructure investment, incorporating social and community dimensions that signaled an expanded conception of industrial policy.

Thus, the resurgence of industrial policy in the United States in the post-pandemic period reflects not only the need to confront the immediate effects of the health crisis, but also an attempt to correct long-term structural trends. It represents a reorientation that repositions the state as an active agent in promoting competitiveness, social cohesion, and economic sustainability. Within this context, the passage of the *Inflation Reduction Act* (IRA) in August 2022 marked a turning point in U.S. economic policy, following a year of unsuccessful negotiations around a broader package (U.S. Congress, 2022). Enacted on August 16, the legislation allocated more than US\$ 400 billion to climate- and health-related programs, raised taxes on large corporations, and projected a cumulative federal deficit reduction of over US\$ 300 billion over the following decade.

Although the IRA encompasses a wide array of measures, its strategic core rests on industrial policy targeting the energy transition and productive restructuring (U.S. Congress, 2022). Institutionally, the law mobilizes two central instruments: incentives for private industry to expand renewable energy production and incentives for consumers to shift patterns of energy use and consumption. Over the next decade, the IRA is expected to raise US\$ 737 billion through higher taxation of large corporations and high-income individuals, as well as reductions in prescription drug spending. These revenues will finance roughly US\$ 437 billion in tax credits and additional expenditures aimed at climate mitigation and lowering health insurance costs (U.S. Congress, 2022).

Of the total investments, approximately US\$ 369 billion over ten years are concentrated in clean-energy and climate-resilience initiatives. Two-thirds of this amount take the form of federal tax credits that extend or create incentives for renewable electricity generation, low-carbon technology development, and the manufacturing of clean-energy equipment. Additional measures support carbon capture and sequestration, the production of renewable fuels, and the strengthening of the electric-vehicle industry (U.S. Congress, 2022).

In this sense, the IRA is not merely a climate policy program; it constitutes an industrial strategy aimed at repositioning the United States as a leader in the green economy. By integrating environmental, social, and industrial objectives, the legislation signals a structural reorientation of U.S. economic policy, reinforcing the central role of the state in promoting competitiveness, technological innovation, and long-term sustainability (ECLAC, 2022).

The election of Trump in 2024 introduces a new configuration in the landscape of U.S. industrial policy. The Trump administration's approach is distinguished by its direct and personalized nature, characterized by centralized decision-making and the use of unilateral instruments without congressional mediation. This approach expands executive power over the economy, enabling the government to acquire equity stakes in strategic firms and obtain *golden shares* with special veto rights. Another defining feature is the expansion of industrial policy's scope, which becomes a routine tool rather than one reserved for exceptional circumstances. (Washington Monthly, 2025)

The administration employs subsidies, equity participation, and profit-sharing arrangements as permanent mechanisms of state intervention. It also adopts a *quid pro quo* logic with firms, demanding financial contributions or profit-sharing in exchange for regulatory benefits or authorizations, as seen in the cases of Nvidia and AMD. The steel sector—historically strategic for the U.S. economy—emerges as a symbol of this new mode of intervention, as the government seeks direct influence over its governance and production decisions. (Washington Monthly, 2025)

Trump's industrial policy remains central but is reconfigured through instruments that reinforce both protectionism and a shift away from climate-oriented policies. The *One Big Beautiful Bill Act* (OBBBA/ACT), signed on July 4, 2025, reorients the climate provisions of the IRA by rescinding key programs — such as the Greenhouse Gas Reduction Fund, unobligated balances of the Innovation and Manufacturing Act, and corporate climate-commitment standardization mechanisms — while postponing the Methane Fee to 2034 (Kirkland & Ellis, 2025). It also designates metallurgical coal as a critical material, making it eligible for advanced production credits (Sec. 70514). Although the legislation retains and even expands incentives for frontier technologies, it reframes them under the umbrella of “national security” rather than climate action — for example, carbon capture and sequestration remains eligible but with additional restrictions on foreign partners (U.S. Congress, 2025, Sec. 70522), and the concept of *qualifying income* for publicly traded partnerships is broadened to include hydrogen storage, advanced nuclear, hydropower, and geothermal energy (Sec. 70524).

The administration also leverages state power to pressure firms into accepting agreements, conditioning export licenses or blocking foreign investments until presidential demands are met. There is, moreover, a risk that such practices become institutionalized, establishing lasting precedents in U.S. economic governance. Ultimately, the result is a policy orientation that—while maintaining industrial and technological ambition—redirects resources and priorities, strengthening strategic technologies not necessarily aligned with decarbonization, weakening the energy transition, and increasing uncertainty for renewable-energy investments, precisely those underpinning future competitiveness in low-carbon energy.

### 2.2.3 European Union (EU)

In the context of low economic growth, population aging, energy shocks—particularly those stemming from the Russia–Ukraine war—and increasing geopolitical fragmentation, European countries have turned to industrial policy to stimulate growth and reinforce the resilience of their supply chains, accompanied by a significant rise in the volume of state aid over the past decade (IMF, 2024). The *New Industrial Strategy for Europe*, launched in 2020, was oriented toward the twin digital and green transitions, aiming to secure clean energy and raw material supply, expand green investment, innovation and infrastructure, and create a leading market for green technologies through regulation, public procurement, and strengthened competition against foreign products. Although it did not explicitly use the term *green industry*, its orientation clearly sought to capitalize on the opportunities of this agenda (Tagliapietra; Veugelers, 2020).

As part of the European Green Deal—under which the EU committed to achieving climate neutrality by 2050—the *Green Deal Industrial Plan for the Net-Zero Age* was launched in 2023. The plan begins from the diagnosis of the exhaustion of the carbon-intensive economic model and the

opportunities opened by the green transition, emphasizing that today's investments will determine Europe's position in the global race for green leadership. Structured around four pillars: (i) a simpler and more predictable regulatory environment, (ii) fast access to financing, (iii) skills development, and (iv) open trade and resilient supply chains, the plan establishes the institutional architecture guiding the instruments and priorities of contemporary EU industrial policy (European Commission, 2023).

From a strategic standpoint, recent European industrial policy combines objectives of competitiveness, green leadership, and the creation of high-quality jobs. The *Green Deal Industrial Plan* states that the EU must “lead the way” in the net-zero industrial era by expanding technological development, manufacturing capacity, and the deployment of net-zero technologies, while simultaneously modernizing and decarbonizing energy-intensive industries (European Commission, 2023). This transformation is closely linked to the creation of qualified employment, supported by just transitions, training, and workforce reskilling. Industrial policy thus becomes a central axis for simultaneously ensuring strategic autonomy, maintaining the bloc's competitiveness, and positioning the EU as a global leader in the green and digital economy.

From the perspective of policy instruments, European industrial policy combines the flexibility of state aid with new financing mechanisms and the strategic use of public procurement. The IMF notes that, under the European Green Deal, regulatory simplification eased rules governing state aid for the green and digital transitions, allowing for an expansion of subsidies (IMF, 2024). The central debate surrounding this shift concerns the tension between national industrial policies and the need to preserve the integrity of the Single Market, given the asymmetric fiscal capacities of Member States (Tagliapietra and Veugelers, 2020). The plan also mobilizes EU-level instruments such as *InvestEU*, the *Innovation Fund*, *REPowerEU*, and the proposed *European Sovereignty Fund*, alongside green public procurement as a demand-side lever for net-zero technologies (European Commission, 2023). Complementary regulatory instruments—the *Emissions Trading System* (EU ETS) and the Carbon Border Adjustment Mechanism (CBAM)—are equally central, reflecting the new competitive landscape in which carbon measurement becomes a criterion of market access.

Finally, the selection of priority value chains and sectors reveals the EU's focus on the green transition and critical technologies. Particular emphasis is placed on scaling the manufacturing capacity of technologies essential to reaching climate neutrality, including *batteries, wind mills, heat pumps, solar technologies, electrolyzers, and carbon capture and storage technologies*. The centrality of critical minerals and raw materials is underscored by the proposed *Critical Raw Materials Act*, which seeks to ensure supply security through source diversification, domestic extraction and processing, and strengthened recycling, reducing dependence on highly concentrated suppliers (European Commission, 2023). Thus, contemporary European industrial policy is organized around a set of green technologies and value chains considered strategic in both the short and long term, fundamental to the bloc's future competitiveness and its energy and technological autonomy.

### 3 Data and methods

Bibliometric analysis consists of the application of quantitative methods to bibliographic data—including titles, keywords, authors, journals, and citations—with the aim of mapping the structure and evolution of scientific fields. This approach makes it possible to identify thematic

patterns, development dynamics, and research gaps, thereby contributing to a broader understanding of knowledge production and supporting the formulation of science and innovation policies. Besides, its application has been increasingly employed to map the structure, evolution and internal differentiation of the green industrial policy literature, revealing how sustainability has been progressively absorbed into industrial policy debates through distinct thematic and analytical clusters (Peres et al., 2026).

In this paper, a bibliometric analysis is conducted using academic articles indexed in the Scopus database, focusing on two countries—the *United States and China*—and one regional bloc—the *European Union*. This selection is justified by the central role these economies play in contemporary debates on industrial policy, particularly because of initiatives such as the *Inflation Reduction Act*, the *European Green Deal*, and *China's 14th Five-Year Plan*.

Although none of these economies abandoned industrial policy initiatives over the past decades—albeit sometimes without explicitly labeling them as such—the recent context marked by the Covid-19, the Russia–Ukraine war, and the intensification of the U.S.–China commercial and technological rivalry has brought renewed attention to the importance of maintaining domestic manufacturing capacities. For this reason, the temporal scope of the analysis is restricted to the post-pandemic period, from 2020 to 2025.

The methodological steps adopted are: (i) defining search criteria and selecting the sample, (ii) establishing the criteria for extracting and refining keywords, (iii) constructing a thesaurus for terminological harmonization, and (iv) generating and analyzing thematic clusters.

### **3.1 Bibliometric analysis and methodology decisions**

The bibliometric analysis was conducted using keyword combinations related to industrial policy and the selected countries or blocs — *the European Union, China, and the United States* — as presented in Table 1. The search, carried out in the Scopus database, aimed to identify and examine the recent scholarly production on industrial policy within each national context, irrespective of the authors' institutional affiliations.

Boolean operators were employed to combine terms — for example, “*industrial policy*” AND “*China*” — and the search was restricted to the 2020–2025 period in order to capture the most recent transformations in industrial policy agendas. Additional filters were applied to include only peer-reviewed journal articles (document type: *article*) published in *English*. The final dataset was retrieved on 28 September 2025.

Table 1  
Search criteria and the size of the sample

Country/Regional Bloc	Keywords	Papers
China (CN)	( “industri* polic*” ) AND ( China )	919
United States of America (USA)	( “industri* polic*” ) AND ( USA ) OR ( “United States” )	189
European Union (EU)*	(“industri* polic*” ) AND (“European Union”) OR (“EU”) OR (“European Commission”) OR (Austria OR Belgium OR Bulgaria OR Croatia OR Cyprus OR Czechia OR Denmark OR Estonia OR Finland OR France OR Germany OR Greece OR Hungary OR Ireland OR Italy OR Latvia OR Lithuania OR Luxembourg OR Malta OR Netherlands OR Poland OR Portugal OR Romania OR Slovakia OR Slovenia OR Spain OR Sweden))	483

Source: Author’s elaboration.

\*Note: In the European Union, all the countries in the regional bloc are being considered.

It is important to note that the analysis involved the construction of a thesaurus, a dictionary of equivalences and exclusions that harmonizes semantically identical or redundant terms. Accordingly, terms with the same meaning —such as *WTO* and *World Trade Organization*— were merged, while words that carry no analytical value on their own, such as country and province names, were excluded. To ensure analytical coherence across the three regions examined, a single thesaurus was applied to all three networks, resulting in 233 modifications, which are documented in Appendix I.

Table 2 presents the main technical parameters used in the *VOSviewer* software to construct the keyword co-occurrence networks. These parameters guide the selection of the term sample analyzed in the subsequent sections and are designed to ensure statistical consistency and comparability across the three national and regional networks (United States, European Union, and China).

Table 2  
Definitions for obtaining the keyword sample on each network\*

Parameter	Configuration	Interpretation	Parameter	Configuration
Type of analysis	Co-occurrence	Measures the strength of association between keywords that appear together in the same documents — captures thematic proximity.	Type of analysis	Co-occurrence
Counting method	Fractional counting	Each document contributes equally, regardless of the number of keywords it contains. Prevents articles with many keywords from distorting the network.	Counting method	Fractional counting

Continua...

Table 2 – Continuation

Parameter	Configuration	Interpretation	Parameter	Configuration
Unit of analysis	All keywords	Includes both author keywords and index keywords. Provides a broad overview of the thematic agenda — although it generates redundancy, which is addressed through the thesaurus. Total all keywords in each network: USA: 1,193; EU: 2,327; CN: 4,616.	Unit of analysis	All keywords
Minimum number of co-occurrences	Evaluated according to database size	Can be fixed for consistency, but should also be tested proportionally to the number of keywords for robustness, given the sample sizes. Applied percentages: USA: 5.69%; EU: 3.27%; CN: 1.82%.	Minimum number of co-occurrences	Evaluated according to database size
Sample	Co-occurrence:USA: 3; EU: 5; CN: 10	Keywords selected: USA: 68; EU: 76; and CN: 84	Sample	Co-occurrence:USA : 3; EU: 5; CN: 10

Source: Author’s elaboration.

\*Note: The keywords for each of the clusters analyzed in each country are available in Appendix 2.

The procedure followed methodological recommendations from the literature (Van Eck; Waltman, 2023; Aria; Cuccurullo, 2017), ensuring that the frequency and association measures between keywords adequately represent the thematic relationships observed in the papers.

### 3.2 Method of defining clusters

The proposed analysis relies on the interpretation of the clusters formed from the keywords selected in each network. According to Waltman, Van Eck and Noyons (2010), the definition of clusters in the VOSviewer software follows the following methodological steps:

$$s_{ij} = \frac{2mc_{ij}}{c_i c_j} \quad (1)$$

where  $c_{ij}$  denotes the number of co-occurrence links between nodes  $i$  and  $j$  ( $c_{ij} = c_{ji} \geq 0$ ), and  $s_{ij}$  represents the strength of association between nodes  $i$  and  $j$ . Furthermore,  $c_i$  denotes the total number of links of node  $i$ , and  $m$  denotes the total number of links in the network ( $m = \frac{1}{2} \sum_i c_i$ ).

The cluster formation requires finding a positive integer node  $i$  ( $x_i$ ) that indicates the clustering to which node  $i$  belongs, which implies minimizing a distance function (Equation 2).

$$V(x_1, \dots, x_n) = \sum_{i < j} s_{ij} d_{ij}^2 - \sum_{i < j} d_{ij} \quad (2)$$

where  $d_{ij}$  denotes the distance between  $i$  and  $j$  given by  $d_{ij} = |x_i - x_j| = \sqrt{\sum_{k=1}^p (x_{ik} - x_{jk})^2}$ , where  $d_{ij} = 0$ , if  $x_i = x_j$ . Otherwise,  $d_{ij} = \frac{1}{\gamma}$ .

The Equation 2 can be interpreted in terms of attractive and repulsive forces between nodes: the first term of the equation represents an attractive force, while the second term represents a repulsive force. The stronger the association between two nodes, the stronger the attractive force pulling them together. The overall effect of these two forces is that nodes with high association strength are drawn toward each other, whereas nodes with low association strength are pushed apart. The existence of a resolution parameter ( $\gamma$ ) distinguishes the clustering technique used by VOSviewer from traditional modularity-based methods. As highlighted by Waltman, Van Eck, and Noyons (2010), this configuration allows the identification of smaller clusters when sufficiently high values are assigned to the resolution parameter, thereby increasing the level of granularity of the network.

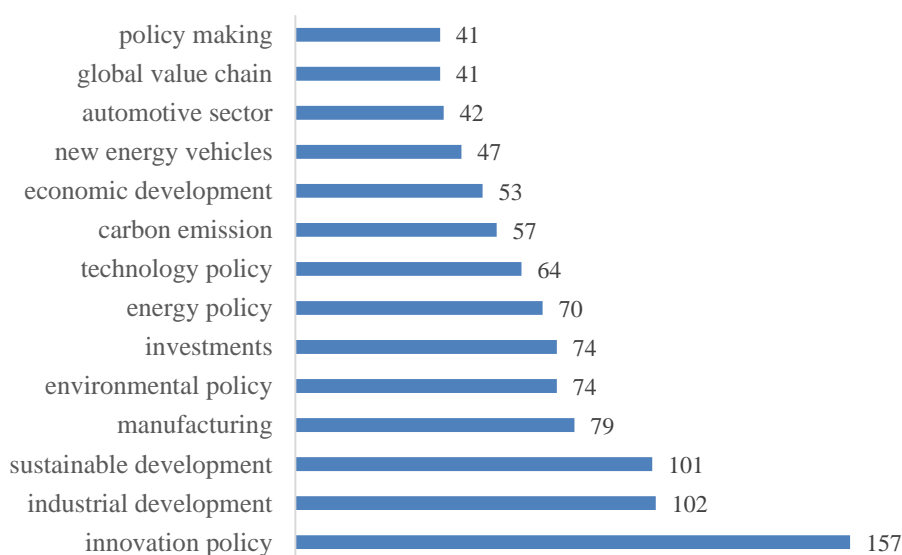
Despite this possibility, this study opted to avoid excessively fragmented groupings. To this end, the software allows the definition of a minimum cluster size—that is, a minimum number of keywords required for a cluster to be considered valid. This configuration was calibrated proportionally to the number of keywords in each network, in order to maintain samples of comparable size and preserve the interpretive relevance of each term in the analysis. The cluster keyword compositions for each of the networks analyzed (China, the United States, and the European Union) are presented in Appendix II.

#### **4 Bibliometric analysis of keyword co-occurrence on industrial policy in selected countries**

##### **4.1 China**

This section presents the bibliometric analysis of the keyword co-occurrence network on industrial policy and China. Based on the graphs and clusters generated, it is possible to identify the main themes and patterns of association that characterize the recent evolution of the academic debate on Chinese industrial development. The network on industrial policy and China reveals, among the fifteen most frequent keywords illustrated in Graph 1, terms related to innovation, industrial development, and sustainability.

Graph 1  
Fifteen most frequent keywords in the network on *industrial policy* and *China*



Source: Author's elaboration based on Scopus data.

In Figure 1, Cluster 1 (red) can be characterized by the predominance of terms that express the strategic core of Chinese industrial policy, articulating economic, institutional, and geopolitical dimensions. The keywords *economic development*, *development strategy*, and *globalization* reflect the long-term planning that is characteristic of the Chinese model. The presence of the term *semiconductor industry* underscores the pursuit of productive and technological autonomy as well as economic security in the face of growing geopolitical tensions. In addition, the set of terms *subsidy system*, *state-owned enterprises*, *financial system*, and *foreign direct investment* highlights classical instruments for the implementation of industrial policy. Within the same cluster, the terms *private sector* and *state role* reinforce the nature of Chinese state governance, which promotes the competitiveness of the private sector. Finally, terms such as *global value chain*, *international trade*, *export*, *WTO*, and *political economy* illustrate the external dimension of Chinese industrial development, oriented toward competitive integration into global value chains. State governance and global integration thus emerge as interdependent elements of a national project.

Cluster 2 (green) concentrates terms associated with the convergence between industrial policy and the energy transition. The strong occurrence of *energy policy*, *green economy*, *climate change*, and *carbon emissions reductions* highlights the transformation of the academic debate toward a conception of industrial policy that incorporates sustainability. This orientation reflects the emergence of a new development paradigm, in which industrial modernization is seen as the pathway to climate mitigation and competitive repositioning. The terms *green innovation*, *renewable energy*, *wind power*, *photovoltaic industry*, and *energy* illustrate the centrality of technological innovation and clean energy sources within industrial policy. Meanwhile, the terms *public policy*, *policy implementation*, and *local government* indicate that this literature also explores the institutional and territorial dimensions of implementation, where the role of local governments emerges as decisive in

operationalizing national goals, translating them into incentives, infrastructure, and cross-sectoral coordination.

Cluster 3 (blue) also reinforces the reconfiguration of Chinese industry in the face of the challenges posed by the green and digital economy. The most frequent term, *sustainable development*, underscores this paradigm shift. The strong presence of the terms *manufacturing* and *investments* indicates the relevance of the productive base and the role of investment as a driver of structural transformation, now subordinated to efficiency and sustainability goals. Terms such as *industrial performance*, *productivity*, and *competitiveness* point to the pursuit of higher value added, cost reduction, and productivity gains. Meanwhile, *digital economy* highlights the integration between productive transformation and digitalization. This cluster thus addresses the twin transition of industry—digital and sustainable—which refers to innovation instruments such as *research and development* and *intellectual property rights*. Finally, the agenda of *developing countries* is noteworthy, with China emerging as a reference for industrial development adapted to the realities of emerging economies.

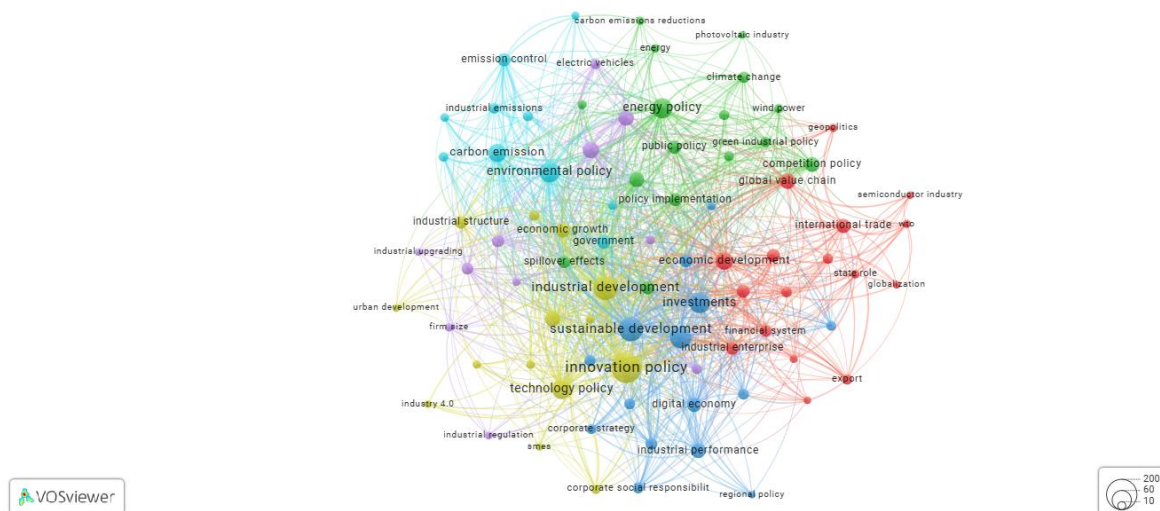
Cluster 4 (yellow) has high occurrences of *innovation policy*, *industrial development*, and *technology policy*, demonstrating that industrial policy places innovation at the core of productive modernization. Terms such as *economic growth*, *industrial structure*, and *industrial production* reinforce the systemic transformation dimension, in which industrial policy simultaneously acts as a driver of growth and as a mechanism for productive reorganization. The presence of *high technology industry* and *coronavirus disease* further highlights the impact of the pandemic on the reorientation of industrial policy, which began to emphasize productive resilience and the strengthening of local supply chains. Finally, the occurrence of *urban development*, *business development*, and *SMEs* expands the scope of industrial policy beyond the manufacturing sphere, linking it to urban development, territorial cohesion, and the strengthening of small and medium-sized enterprises. The combination of terms in this cluster suggests a role for industry that goes beyond accumulation, as by fostering regional development and supporting small enterprises, it can contribute to greater social cohesion.

Cluster 5 (purple) concentrates terms related to the technological transformation of the automotive sector and the energy transition. The occurrences of *new energy vehicles* and *automotive sector* highlight the centrality of the automotive industry as a field of experimentation for industrial and environmental policies in China. The emphasis on *technology innovation* and *environmental regulations* reinforces the relationship between competitiveness and sustainable technologies. In turn, the term *policy evaluation* reveals an effort to measure results and impacts, contributing to the evolution of evidence-based governance mechanisms. Finally, terms such as *firm size*, *uncertainty analysis*, *industrial regulation*, and *industrial upgrading* express dimensions associated with business behavior and adaptation strategies in the face of technological transition. This cluster points to core aspects of green industrial policy, in which energy transition, environmental regulation, and innovation in the automotive sector become vectors of modernization and technological learning.

Cluster 6 (light blue) brings together terms that reinforce the centrality of environmental and climate policies in China's industrial transformation. The presence of *government* and *emission control* underscores the importance of state coordination in designing regulatory instruments aimed

at reducing emissions and strengthening climate governance, in line with China’s commitments over recent decades. Terms such as *industrial emissions*, *pollution policy*, and *carbon dioxide* signal efforts to control the negative externalities of production and to incorporate decarbonization targets into economic planning. The emphasis on *industrial technology* indicates that the solution to these challenges lies in technological innovation, particularly in processes and equipment that are more efficient and less carbon-intensive. Finally, the occurrence of *air pollution* and *coal* highlights the persistence of structural challenges in China’s energy matrix, which remains heavily dependent on coal, and the complexity of reconciling economic growth with environmental goals.

Figure 1  
Co-occurrence network on *industrial policy* and *China*\*



Source: Author’s elaboration based on Scopus data

\* Note: Figure 1 presents the 83 keywords (excluding *industrial policy*) that have at least 10 co-occurrences in the network on industrial policy and China. This network enables the formation of five clusters and highlights three keywords: *innovation policy*, *industrial development*, and *sustainable development*.

Finally, it is important to analyze the results of the clusters in relation to the dimensions that are the focus of this study:

- **Strategic agenda:** Oriented toward economic development, technological autonomy, and international integration. The analysis indicates a model guided by state planning and insertion into global value chains, concomitant with the transition to a paradigm that combines sustainability, innovation, and digital transformation. The country appears to converge toward a strategic and adaptive orientation, revealing a project of productive modernization that seeks to consolidate China as a technological and environmental power, sustaining its competitive position in a global context of green and digital transition.
- **Industrial policy instruments:** These combine tax incentives, public financing, environmental regulation, and intellectual property protection mechanisms that reinforce governmental coordination capacity and the experimental character of industrial policy. This institutional architecture relies on the interaction among different levels of government and on the

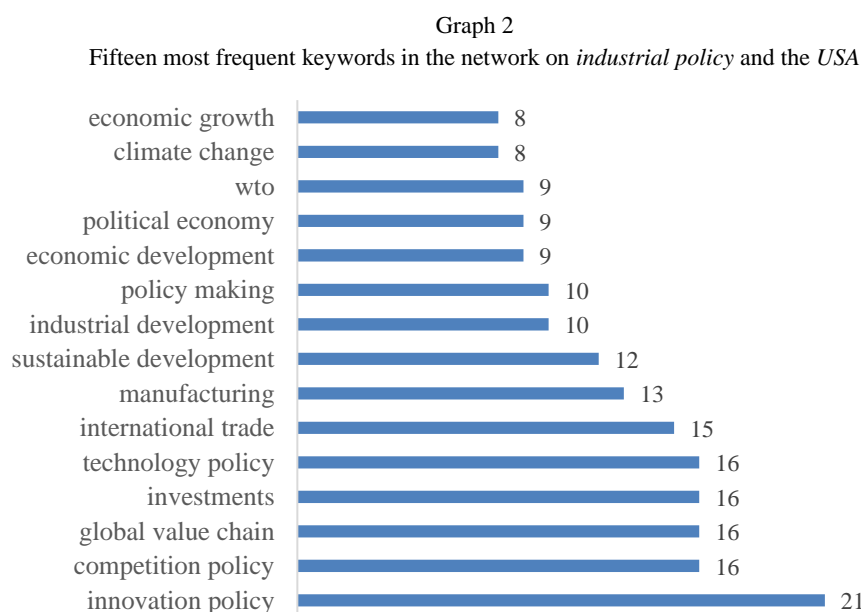
consolidation of a governance model based on evidence, monitoring, and evaluation of results.

- Productive chains and strategic sectors: *Semiconductor industry, automotive sector, photovoltaic industry, wind power, new energy vehicles, and electric vehicles*, which signal the selection of key technologies for the country’s productive and energy repositioning.

In summary, the analysis presents that recent Chinese industrial policy is structured around a broad and coherent strategy of productive modernization, sustained by the combination of technological autonomy, sustainable development, and competitive integration into global value chains. The strategic agenda reveals a model guided by state planning, in which innovation, digitalization, and the energy transition constitute central vectors of structural transformation.

#### 4.2 United States of America (USA)

In the analysis of the terms *industrial policy* and *United States*, it is observed that among the fifteen most frequent keywords presented in Graph 2, particular emphasis is placed on *innovation policy, competition policy, and global value chain*. The predominance of these terms indicates an industrial strategy strongly oriented toward innovation and international competition.



Source: Author’s elaboration based on Scopus data.

In Figure 2, Cluster 1 (red) has the presence of *investments, manufacturing, and industrial development* indicates that U.S. industrial policy seeks to strengthen its productive base through increased investment and the stimulation of domestic manufacturing capacity. Terms such as *economic development, economic policy, and policy evaluation* signal the results-oriented nature of these policies, often structured around impact assessments, monitoring, and accountability mechanisms. The recurrence of *political economy, geopolitics, and techno-nationalism* points to the

growing influence of geopolitical disputes in the formulation of U.S. industrial policy, particularly in the context of technological competition with China and the reorganization of global value chains. The presence of *industry 4.0*, *artificial intelligence*, and *energy transitions* reinforces the centrality of emerging technologies and the energy transition in shaping industrial priorities, while *government*, *state role*, and *regulation* show that the U.S. state plays a significant role in fostering innovation and setting technological and regulatory standards. Finally, terms such as *regional policy*, *structural change*, and *developing countries* suggest concerns with the territorial reconfiguration of production and with the United States' position in global production dynamics.

The analysis of Cluster 2 (green) points to a U.S. industrial policy strongly oriented toward innovation, competitiveness, and geoeconomic disputes. The prominent presence of *innovation policy*, *technology policy*, and *R&D* indicates that technological innovation is the structuring axis of industrial priorities. The occurrence of *global value chain*, *international trade*, and *globalization* underscores the importance of global value chains and international trade for U.S. industrial strategy. Terms such as *WTO*, *tariffs*, and *trade war* highlight the growing use of trade instruments as part of industrial policy. In addition, the recurrence of *subsidy system*, *competitiveness*, and *intellectual property rights* points to the combined use of tax incentives, strategic subsidies, and intellectual property protection as mechanisms for strengthening industrial competitiveness. The presence of *semiconductor industry*, *new energy vehicles*, and *automotive sector* shows that there are critical sectors for economic and technological security, which is also reflected in the term *national security*, indicating the increasing overlap between industrial policy and national security policy. Finally, the occurrence of *employment* suggests that U.S. industrial policy is also shaped by domestic concerns.

The Cluster 3 (blue) indicates that U.S. industrial policy incorporates the discussion of the green agenda and environmental concerns, illustrated by the presence of *sustainable development*, *climate change*, *environmental policy*, and *green transition*. Terms such as *economic growth*, *industrial performance*, and *industrial production* reveal that environmental goals are articulated with traditional objectives of productivity and industrial expansion, indicating a strategy that seeks to reconcile economic competitiveness with the energy transition. The terms *corporate social responsibility*, *market conditions*, and *financial system* play a relevant role in the discussion of the environmental agenda by aligning economic incentives with sustainability goals. Finally, terms such as *public policy*, *policy implementation*, *local government*, and *mitigation* underscore the role of different levels of government in operationalizing environmental and industrial policies. At this point, it is noted that this agenda reflects little of the recent shifts in U.S. economic and industrial policy, which have moved further away from environmental priorities.

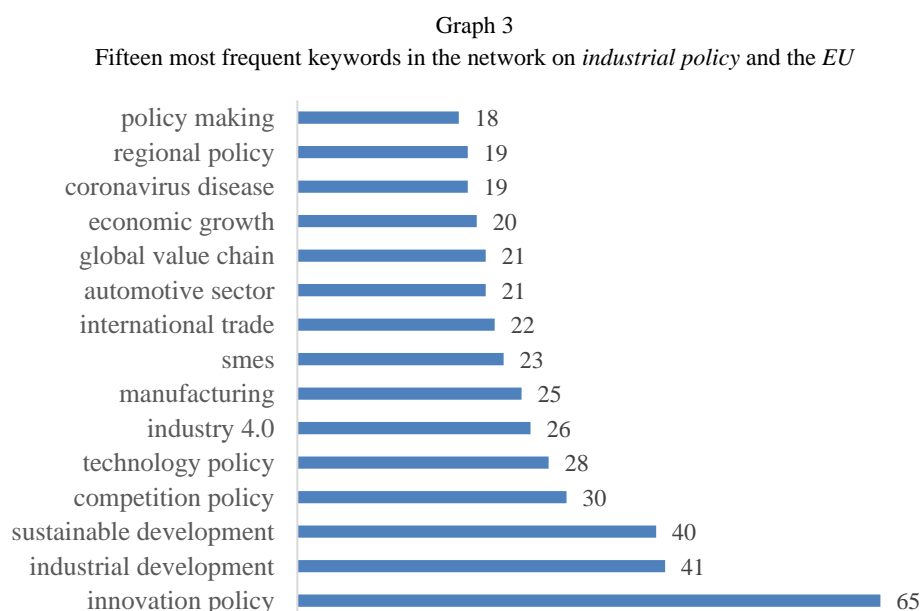
Finally, Cluster 4 (yellow) highlights the articulation across competition policy, environmental regulation, and energy policies within U.S. industrial policy. The predominance of *competition policy*, *policy making*, and *antitrust* reflects a characteristic feature of the United States: the use of antitrust instruments to shape market structures. The presence of *energy policy*, *carbon emissions reductions*, and *emission control* indicates the integration of the environmental agenda into the design of industrial policies, particularly through incentives and regulations. Terms such as *solar power*, *photovoltaic industry*, and *incentive* point to the relevance of renewable energy sectors, supported by mechanisms of economic stimulus and cost-reduction strategies, reinforced by the



engaging in geopolitical rivalry with China. These elements point to an industrial policy oriented by geoeconomic competition, the reconstruction of manufacturing capacity, and technological leadership in critical sectors.

### 4.3 European Union (EU)

The analysis of 483 academic articles on European Union industrial policy, published between 2020 and 2025, identified five thematic clusters, all structured around the central keyword “industrial policy.” The fifteen most frequent keywords in this sample, as illustrated in Graph 3, reveal the main field of recent literature, indicating that European industrial policy has been guided by a strategic agenda oriented toward technological innovation, sustainability, the reconfiguration of production chains, and the strengthening of critical industrial sectors.



Source: Author’s own elaboration based on Scopus data.

The industrial policy of the European Union (EU) has undergone significant evolution over the past decades, reflecting both global economic transformations and the internal challenges faced by its Member States. Keyword co-occurrence analysis constitutes an effective methodological tool for identifying the main thematic axes that structure this field across the countries of the European bloc. Accordingly, we present the analyses of the clusters identified through the applied methodological approach.

Cluster 1 (red), located in the center-right of Figure 3, highlights four interconnected segments that outline the contemporary industrial policy of the European Union. The first core is oriented toward productive modernization, with emphasis on industrial development, productivity, and structural change. The second axis addresses the EU’s integration into global value chains, evidenced by terms such as international trade, globalization, and intellectual property, reflecting alignment with multilateral norms and the protection of European innovation. The third grouping

focuses on competition policy and state instruments, revealing the tension between market regulation and public intervention, particularly in times of crisis. Terms such as subsidies, public procurement, and state aid indicate greater flexibility to support strategic sectors. Finally, the cluster incorporates a historical and strategic dimension, marked by the alternation between liberalism and interventionism, with increasing emphasis on productive autonomy in critical sectors such as energy and green technologies, in the face of an unstable and competitive global environment.

Cluster 2 (green), located in the center-left of Figure 3, underscores the importance of small and medium-sized enterprises (SMEs), innovation, and the role of the state in the industrial policy of the European Union. Terms such as SMEs, business development, export, investments, and profitability reveal the focus on strengthening the European business fabric, fostering growth, internationalization, and competitiveness. The presence of research and development, industrial technology, and innovation policies indicates that innovation is regarded as the central driver of industrial transformation, with policies aimed at integrating firms, universities, and research centers.

In addition, the cluster incorporates themes related to crisis response and the renewed valuation of state action. The mention of coronavirus disease highlights the impact of the pandemic on the reformulation of industrial strategies, while terms such as state role, state-owned enterprises, and financial system point to greater acceptance of public intervention in strategic sectors. The presence of energy transitions, capitalism, and entrepreneurship suggests that EU industrial policy is being redesigned to reconcile economic growth, innovation, and sustainability within a context of energy transition and systemic transformation.

Cluster 3 (blue), located in the left corner of Figure 3, highlights the centrality of technological innovation in the industrial policy of the European Union, with emphasis on the keywords innovation policy, technology policy, and Industry 4.0. These terms reveal the EU's effort to promote a digitized, resilient, and technologically transformative industrial base. In this context, Industry 4.0 represents a structural shift in production processes, driving automation, artificial intelligence, and the integration of advanced systems. This agenda is accompanied by policies of regional specialization and digital economy development, with particular attention to smart specialization, digital economy, and entrepreneurship.

Cluster 3 also incorporates institutional and geopolitical dimensions that shape the implementation of industrial policies. Terms such as policy implementation, policy evaluation, and institutional framework indicate the importance of effective governance structures and monitoring mechanisms. The presence of geoeconomics, Brexit, and future prospect points to the growing influence of external and strategic factors in the formulation of industrial policies, especially within a global scenario marked by uncertainty and technological competition. Taken together, the cluster underscores a forward-looking industrial policy that combines innovation, territorial cohesion, and institutional adaptation to new economic and geopolitical dynamics.

Cluster 4 (yellow), located in the central part of Figure 3, highlights the integration of sustainability, economic growth, and sectoral performance within the industrial policy of the European Union. The central keywords—sustainable development, automotive sector, and economic growth—reveal an agenda oriented toward the ecological modernization of industry, with particular emphasis on strategic sectors such as automotive, which faces challenges of electrification and



Based on the analysis of the five thematic clusters, it is possible to conclude that the industrial policy of the European Union, from 2020 to 2025, exhibits patterns that reflect a strategic reconfiguration in response to technological, environmental, and geopolitical transformations. In line with the objective of this study, three dimensions of European industrial policy are examined:

- Strategic agenda: The clusters reveal the centrality of technological innovation, the green transition, and strategic autonomy, with particular emphasis on themes such as innovation policy, strategic autonomy, and sustainable development.
- Industrial policy instruments: There has been an expansion and sophistication of the mechanisms employed, including *subsidies, public procurement, regulation, and support for SMEs*, as well as more recent instruments such as carbon markets and intellectual property protection, which have gained relevance as tools for technological and environmental induction.
- Production chains and strategic sectors: The presence of terms such as *automotive sector, defense industry, construction industry, and Industry 4.0* confirms that EU industrial policy is being redesigned to strengthen critical sectors, reduce external vulnerabilities, and position the bloc as a leader in the green and digital economy.

In conclusion, the analysis of the five thematic clusters demonstrates that the European Union's industrial policy since 2020 has undergone a profound strategic reconfiguration in response to technological, environmental, and geopolitical transformations. The evidence points to a multidimensional agenda that combines innovation, sustainability, and strategic autonomy, supported by increasingly sophisticated policy instruments and directed toward strengthening critical sectors and production chains. Taken together, these dynamics reveal an industrial policy that not only seeks to enhance competitiveness and resilience but also positions the EU as a global leader in the transition toward a green and digital economy.

## **5 Concluding remarks: an analysis of the convergences across industrial policy in China, the EU, and the USA**

The set of transformations to which the international economy has been subject at least since the Great Financial Crisis of 2008 has revived debates on the limits of the development model that characterized the apex of globalization. A central dimension of this renewed debate concerns the recognition of the productive structure as a key determinant of socially and environmentally sustainable long-term development trajectories. In this context, both academic and policy circles have witnessed a renewed interest in industrial policy.

Against this backdrop, this article seeks to identify the main patterns of industrial policy initiatives adopted by the European Union, China, and the United States since 2020, and to examine the leading academic and interpretative trends that have emerged around this renewed policy agenda.

To understand how industrial policy has been reinterpreted since 2020, it is essential to observe the patterns of convergence among China, the European Union, and the United States in their national models. The bibliometric analysis reveals several points of approximation.

In the strategic agenda, notable convergences emerge across the three cases, particularly in the emphasis on green development, expressed through terms such as sustainable development, green

economy, green innovation, green industrial policy, and green transition. This indicates that industrial policy is no longer climate-neutral but explicitly incorporates sustainability and decarbonization objectives. Digitalization also appears as a common axis, through terms such as industry 4.0 and digital economy, reflecting the growing integration between productive transformation and advanced digital technologies.

In addition, geopolitics, national security, strategic autonomy, techno-nationalism, and technological sovereignty demonstrate that economic security and geopolitical disputes have become structuring dimensions of contemporary industrial policy, responding to systemic tensions such as U.S.–China competition, trade wars, and technological and energy dependence. The recurrence of global value chain, international trade, and globalization further reveals a shared concern with external integration and positioning within global value chains.

In the field of industrial policy instruments, the subsidy system appears in all cases. Among innovation instruments, intellectual property rights stand out, reinforcing that industrial policy is strongly anchored in the generation, protection, and diffusion of knowledge. Regulatory instruments also converge, particularly carbon emissions reductions and emission control, which indicate the incorporation of climate regulation as an industrial tool. The term state role, present in all three networks, highlights a common reevaluation of state intervention, while state-owned enterprises—present in China and the EU—reinforce the institutional diversity of public involvement in industrial development.

In terms of productive chains and strategic sectors, convergence is identified in core areas of the energy transition, such as renewable energy, wind power, photovoltaic industry, and solar power, as well as in the decarbonization of energy-intensive sectors. The automotive sector also stands out—automotive sector, new energy vehicles, and electric vehicles—indicating that electric mobility has become a common axis for experimenting with industrial and climate instruments. The semiconductor industry and other high-technology segments appear as shared strategic sectors, associated both with competitiveness and with national and technological security.

The apparent convergence of contemporary industrial policy agendas since 2020 does not signal the emergence of a shared development model. Rather, it reflects the adaptation of industrial policy to position-specific challenges within the global productive and technological hierarchy. While similar instruments, sectors, and narratives are mobilized across China, the United States, and the European Union, industrial policy fulfills distinct structural functions in each case: in China, it operates as a strategy to upgrade and consolidate the country's position in global value chains; in the United States, as a tool to defend and reorganize technological leadership; and in the European Union, as a mechanism to preserve competitiveness and strategic autonomy under strong institutional and fiscal constraints.

However, there is a common pattern: in the productive and technological domains, the transition toward a new techno-economic paradigm appears to be the primary force guiding recent industrial policy actions. On the one hand, this convergence may reflect a shared interpretation of the limits of the development model that prevailed during the peak of globalization. On the other hand, it may also suggest that local socio-economic specificities have been overshadowed by *old ideas in new bottles*. In line with the framework advanced by List (1841), even the so-called “new” industrial policy seems to place greater emphasis on issues central to nation-building per se than on policies

explicitly aimed at reducing socio-economic disparities—particularly those affecting marginalized segments of the population.

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## Appendices

### Appendix I Thesaurus

label	replace by	label	replace by
article		germany	
conceptual framework		governance approach	
controlled study		green technology innovation	green innovation
européu		green technology	green innovation
human		gross domestic product	economic growth
industrial policies	industrial policy	growth rate	economic growth
investment	investments	guangdong	
world trade organization	wto	hebei	
air quality	air pollution	humans	
atmospheric pollution	air pollution	índia	
analytical framework		industrial structures	industrial structure
beijing [beijing (ads)]		industry policy	industrial policy
beijing [china]		influencing fator	
dioxide carbon	carbon emission	information asymmetry	
carbon emissions	carbon emission	integrated approach	
carbon neutralities	carbon neutrality	internet	information technology
chinese		japan	
city		jiangsu	
cluster analysis		knowledge	
coal industry	coal	leadership	
coal mining	coal	life cycle analysis	
comparative study		malaysia	
competition (economics)	competition policy	manufacture	manufacturing
covid-19	coronavirus disease	natural experiment	
correlation		new energy enterprise	new energy industry
costs		pandemic	coronavirus disease
data envelopment analysis		patents	intellectual property rights
data mining		photovoltaic system	photovoltaic industry
data set		policy analysis	policy evaluation
database		policy makers	policy making
decarbonisation	carbon emissions reductions	policy tools	policy instruments
decarbonization	carbon emissions reductions	population statistics	
difference-in-differences		price dynamics	
differences-in-differences		shanghai	
driving forces		shenzhen	

economic analysis		south africa	
economic growths	economic growth	south korea	
economics		state-business relations	state-owned enterprises
electric vehicle	electric vehicles	taiwan	
empirical analysis		thailand	
empirical studies		Tianjin	
energy use	energy policy	united states	
environmental regulation	environmental regulations	zhujiang delta	
experimental study		vehicles	automotive sector
factor analysis		electricity vehicles	new energy vehicles
global value chains	global value chain	alternative energy	energy policy
green innovations	green innovation	carbon	carbon emission
heterogeneity		yangtze river	
high quality		finance	financial system
industrial emission	industrial emissions	policy	
industrial research		france	
industrial structure upgrading	industrial upgrading	spain	
influencing factor		italy	
influencing factors		poland [central europe]	
input-output analysis		sweden	
invention	inventions	poland	
manufacturing industries	manufacturing	hungary	
manufacturing industry	manufacturing	portugal	
mediating effect		united kingdom	
moderating effect		finland	
network analysis		eu	
new energy industries	new energy industry	european commission	
new energy vehicle	new energy vehicles	romania	
numerical model		ireland	
optimization		england	
panel data		new york [united states]	
patent	intellectual property rights	india	
perception		us	
performance		mexico	
performance assessment		usa	
policy optimization		guideline	
pollution control	pollution policy	vehicle industry	automotive sector
qualitative analysis		trade policy	international trade
quantitative analysis		canada	
regression analysis		industrial competition	competition policy
renewable energies	renewable energy	commercial phenomena	
sensitivity analysis		digitization	digital economy

simulation		industrial investment	investments
social network		electric vehicle	new energy vehicles
social network analysis		patentes and investions	intelectual property rights
spatial analysis		government subsidies	subsidy system
spatial distribution		agglomeration	
spatiotemporal analysis		envrionmental economics	environmental policy
spillover effect	spillover effects	environmental management	environmental policy
state owned enterprise	state-owned enterprises	industry	
statistics		commerce	
strategic approach		planning	
subsidies	subsidy system	competition	competition policy
supply chain	global value chain	sustainability	sustainable development
supply chains	global value chain	recycling	circular economy
supply chain management	global value chain	automotive industry	automotive sector
sustainable development goal	sustainable development goals	automobile industry	automotive sector
technological innovation	technology innovation	small and medium-sized enterprise	smes
text analysis		trade	
text mining		entrepreneur	entrepreneurship
theoretical study		innovation	innovation policy
threshold effect		regional development	regional policy
total factor productivity		specialization	
transformation		technological development	technology policy
uncertainty		technology adoption	technology policy
beijing		technology	technology policy
brazil		industrial economics	industrial development
capital		digital transformation	digital economy
china		policy approach	
chinese cities		regional economoy	regional policy
chinese listed companies		decision making	policy making
cities		international political economy	international trade
coronavirus disease	coronavirus disease	international relations	international trade
corporates		multilateral trade	international trade
developing world	developing countries	semiconductors	semiconductor industry
economic and social effects		merger	
economic aspect		environmental economics	environmental policy
efficiency measurement		patents and inventions	intellectual property rights
energy consumption	energy policy	industrialization	industrial development
europa		energy efficiency	energy policy
europa union		energy utilization	energy policy
financial constraints	financing constraints	environmental protection	environmental policy

Appendix II  
Keywords and the cooccurrences of the three networks (China, EU, USA)

China		EU		USA	
Keywords	Occurrences	Keywords	Occurrences	Keywords	Occurrences
<b>Cluster 1</b>		<b>Cluster 1</b>		<b>Cluster 1</b>	
economic development	53	industrial development	41	investments	16
global value chain	41	competition policy	30	manufacturing	13
international trade	35	international trade	22	industrial development	10
subsidy system	30	economic development	14	economic development	9
state-owned enterprises	29	competitiveness	13	political economy	9
industrial enterprise	28	globalization	13	policy evaluation	8
financial system	24	subsidy system	12	coronavirus disease	7
foreign direct investment	19	industrial production	10	economic policy	7
export	18	regional economy	9	industry 4.0	7
political economy	18	state aid	9	geopolitics	6
state role	13	wto	9	developing countries	5
geopolitics	12	economic history	8	regional policy	5
wto	12	climate change	7	artificial intelligence	4
development strategy	11	intellectual property rights	7	government	4
globalization	10	productivity	7	state role	4
private sector	10	structural change	6	conditionality	3
semiconductor industry	10	development	5	drug industry	3
<b>Cluster 2</b>		public procurement	5	energy transitions	3
energy policy	70	spillover effects	5	regulation	3
competition policy	38	<b>Cluster 2</b>		structural change	3
green economy	38	smes	23	techno-nationalism	3
green innovation	31	coronavirus disease	19	<b>Cluster 2</b>	
public policy	31	investments	14	innovation policy	21
policy implementation	29	business development	10	global value chain	16
spillover effects	26	export	10	technology policy	16
climate change	22	research and development	10	international trade	15
green industrial policy	19	stakeholder	9	wto	9
renewable energy	18	financial system	7	subsidy system	8
local government	17	industrial technology	7	competitiveness	7
green development	14	innovation policies	7	green industrial policy	7
wind power	14	capitalism	5	intellectual property rights	7

energy	13	energy transitions	5	semiconductor industry	7
carbon emissions reductions	12	profitability	5	globalization	6
photovoltaic industry	10	state role	5	national security	5
<b>Cluster 3</b>		state-owned enterprises	5	new energy vehicles	5
sustainable development	101	<b>Cluster 3</b>		automotive sector	4
manufacturing	79	innovation policy	65	employment	4
investments	74	technology policy	28	trade war	4
industrial performance	38	industry 4.0	26	r&d	3
digital economy	36	manufacturing	25	tariffs	3
intellectual property rights	29	global value chain	21	<b>Cluster 3</b>	
productivity	24	regional policy	19	sustainable development	12
research and development	22	policy evaluation	14	climate change	8
corporate social responsibility	21	policy implementation	14	economic growth	8
financing constraints	21	digital economy	12	environmental policy	8
developing countries	20	entrepreneurship	9	industrial performance	8
competitiveness	17	brexit	7	corporate social responsibility	5
corporate strategy	17	future prospect	7	policy implementation	5
efficiency	12	geoeconomics	6	public policy	5
regional policy	10	institutional framework	6	capitalism	4
<b>Cluster 4</b>		smart specialization	6	industrial production	4
innovation policy	157	<b>Cluster 4</b>		market conditions	4
industrial development	102	sustainable development	40	financial system	3
technology policy	64	automotive sector	21	food industry	3
policy making	41	economic growth	20	green economy	3
economic growth	37	policy making	18	green transition	3
industrial structure	27	energy policy	14	local government	3
coronavirus disease	18	employment	12	mitigation	3
industrial production	15	environmental policy	12	<b>Cluster 4</b>	
industrial agglomeration	13	industrial performance	12	competition policy	16
high technology industry	12	circular economy	11	policy making	10
business development	11	public policy	8	energy policy	6
urban development	11	carbon emission	6	carbon emissions reductions	5
industry 4.0	10	construction industry	6	solar power	5
smes	10	industrial structure	5	antitrust	3

Cluster 5		Cluster 5		Cluster 5	
new energy vehicles	47	political economy	11	cost analysis	3
automotive sector	42	strategic autonomy	10	emission control	3
technology innovation	26	carbon emissions reductions	9	incentive	3
environmental regulations	24	geopolitics	9	information technology	3
electric vehicles	19	green transition	9	photovoltaic industry	3
policy evaluation	18	energy transition	8		
incentive	14	defence industry	7		
firm size	12	national security	7		
uncertainty analysis	12	resilience	7		
industrial regulation	11	neoliberalism	6		
industrial upgrading	10	technological sovereignty	6		
Cluster 6		regulation	5		
environmental policy	74	reshoring	5		
carbon emission	57				
government	32				
emission control	30				
industrial emissions	19				
pollution policy	17				
carbon dioxide	16				
industrial technology	14				
air pollution	13				
coal	11				