

Reshaping Europe's industrial future: the impact of the new political landscape on industrial policy and competitiveness in five CEE countries

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Abstract: Amid the rising geopolitical tensions between the EU's states, a tendency towards radicalism and protectionism in Western countries, and an increase in interest in nationalistic autonomy, there is a pressing need for a new direction. Recent developments, such as the Green Deal Industrial Plan, the Net-Zero Industry Act and the European Chips Act, raise questions about their effectiveness in strengthening Europe's industrial base and resilience. This article examines the impact of political shifts on industrial policy and competitiveness in Central and Eastern Europe, with a three-year period (2022-2025) of data following key indicators (GDP growth, FDI, R&D, education, innovation indices) from five CEE countries (Poland, Czech Republic, Hungary, Romania, Slovakia). The study, therefore, addresses the under-explored gap between EU industrial ambitions and national absorptive capacity and competitiveness. The findings highlight diverging approaches: while Czech Republic and Poland benefit from innovation and stability, Hungary offsets slow growth with massive but strategically dependent FDI. It suggests that without stronger governance reforms, targeted investment in human capital and regionally tailored implementation of EU industrial instruments, the transitions may reinforce a 'Two-Speed' industrial Europe rather than closing existing gaps.

Keywords: industrial policy, competitiveness, Central and Eastern Europe, Green Deal, geopolitical tensions

Introduction

In recent years, the European Union has faced a confluence of geopolitical, economic, and technological disruptions that have exposed both vulnerabilities and opportunities within its industrial system. Events such as Brexit, the COVID-19 pandemic, the war in Ukraine, and global supply chain instabilities—especially in critical sectors like semiconductors and clean technologies—have intensified the EU's awareness of its strategic dependencies. Simultaneously, a global ideological shift toward protectionism, national sovereignty, and economic resilience has pushed European institutions to reconsider the foundational principles of their industrial

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policies. In this context, the call for a new, pragmatic, and innovation-driven industrial strategy has become increasingly urgent. Political figures such as Mario Draghi and EU Commissioners have emphasised the need for a results-oriented approach that balances competitiveness, technological leadership, and climate commitments. Yet, as the EU develops ambitious instruments such as the Green Deal Industrial Plan (European Commission, 2023d), the Net-Zero Industry Act (European Commission, 2023e), and the European Chips Act (European Commission, 2023g), it remains unclear to what extent these policies can generate inclusive and sustainable industrial growth across all member states—especially in the more structurally fragile Central and Eastern European (CEE) economies.

This article is motivated by the growing gap between EU-level strategic ambition and the diverse capacities of member states to absorb, implement, and benefit from such initiatives. While considerable attention has been paid to the EU's industrial transition at a macro level, less scholarly work has addressed the differentiated impact of these strategies across regions with distinct institutional, economic, and educational profiles. For our study's particular case, we chose five countries from CEE, and we conducted our detailed research on data and indicators regarding the five of them: Poland, Czech Republic, Hungary, Romania and Slovakia. Because all five states are both beneficiaries and challengers of the integration process, we believe a focused analysis will be useful for expanding the knowledge of our academic field through the present article.

Discussing the gap and addressing this hiatus, the article adopts a mixed-methods research strategy, combining the strength of the qualitative approach and the insightful perspective of data comparison of specific indicators such as GDP, FDI, R&D, or percentages regarding growth in innovation, education, and implementation of green strategies through national and European policies.

The motivation behind this choice lies in the complexity of the subject matter, which requires both numerical evaluation of competitiveness indicators and interpretive analysis of institutional, policy, and structural dynamics. The research draws on official policy documents, economic databases (Eurostat, OECD, World Bank, European Innovation Scoreboard), national strategies, and academic sources. The period of analysis covers developments between 2022 and 2025, reflecting the post-COVID recalibration of EU industrial policy (European Commission, 2023b, 2024a).

For this broader investigation, we wish to address in our article the misalignment between the EU's ambitious industrial agenda and the institutional and human-capital constraints of five Central and Eastern European member states. The core question of the study is how far new EU industrial instruments translate into improved competitiveness in these countries and which structural factors facilitate or hinder this translation. In a more detailed manner, addressing the qualitative dimension, we want to see how recent EU industrial policy instruments (the Green Deal Industrial Plan, Net-Zero Industry Act, Critical Raw Materials Act, European

Chips Act) conceptualise competitiveness and strategic autonomy in relation to the green and digital transitions. How do Poland, Czech Republic, Hungary, Romania and Slovakia perform on key competitiveness-related indicators (GDP growth, FDI, R&D, innovation and education) during 2022–2025? What patterns emerge regarding their capacity to align with EU industrial objectives?

To answer these questions, the structure of the article proceeds as follows. First, the Literature Review and Theoretical Framework discuss relevant concepts such as industrial policy, strategic autonomy, innovation economics, institutional political economy, education policy, protectionism vs innovation, and two-speed Europe, but rather than overlapping the problems, we will use these frameworks to underline one central issue: how EU industrial policy translates into differentiated competitiveness outcomes in CEE, conditioned by institutions and human capital. The Methodology of Research section explains the rationale for a mixed-methods approach and outlines the data sources, indicators, and timeframe used. The Results section presents comparative data on key competitiveness metrics such as GDP growth, FDI, R&D expenditure, and education levels for five CEE countries and the EU average. The Discussion section interprets these findings through qualitative and comparative analysis, highlighting cross-country disparities, governance challenges, and structural constraints. Finally, the Conclusion addresses the research questions and outlines key insights derived from the study, including potential policy pathways for enhancing inclusive industrial development across the European Union. As EU Commissioner Thierry Breton declared, “Europe must wake up. If we don’t act, we will become dependent on others for technologies and raw materials that are essential for our future.” (Breton, 2022) This quote drives home the stakes of this research—strategic autonomy and competitiveness are no longer luxuries but necessities.

1. Literature review

A significant body of literature and policy documents has emerged in recent years addressing the EU’s shift toward a more strategic and interventionist industrial policy. Notable documents or proposals are the European Commission’s Green Deal Industrial Plan (European Commission, 2023d), the Net-Zero Industry Act, the Critical Raw Materials Act (European Commission, 2023f), and the European Chips Act. These initiatives reflect a paradigmatic shift (European Commission, 2022) from passive market facilitation to active market shaping. Scholars at think tanks such as Bruegel, CEPS, and the European Policy Center argue that these new policies indicate a partial departure from the EU’s traditional reliance on competition law and market liberalism (Andrenelli & Navaretti, 2023). We underline an emerging challenge here: unless there is a European response that matches the scale of the challenge, the EU risks losing ground in global industrial leadership (Darvas et al., 2025). The theoretical underpinnings of this study are rooted in an interdisciplinary mix of industrial policy theory, strategic autonomy, innovation economics,

institutional political economy, competitiveness and lastly Green and Digital Transitions.

Recent contributions in EJES have highlighted how debates on strategic autonomy and the future of the European political order intersect with differentiated integration and CEE's role in EU governance. Our study builds on this strand by shifting the focus from security/institutional debates to the industrial and competitiveness consequences of the new policy instruments, thus bridging EJES's political-institutional analyses with industrial policy and economic performance (Schmidt, 2022)

Firstly, industrial policy theory has evolved from its traditional 20th-century interpretation of sector-specific subsidies and protectionism to a more holistic framework that includes ecosystem support, green innovation, and digital infrastructure. Contemporary industrial policy promotes "mission-oriented" strategies aimed at achieving public goals such as climate neutrality, technological sovereignty, and digital transformation. It also examines how government interventions can shape economic development by supporting specific sectors, fostering innovation, and enhancing competitiveness. In the European context, the recent initiative "Green Deal Industrial Plan" reflects a strategic shift toward aligning industrial growth with sustainability goals. Effective industrial policy must balance market forces with state support, ensuring resilience amid geopolitical tensions and global supply chain disruptions.

Secondly, the discourse on strategic autonomy is no longer confined to defence and foreign affairs. In the EU context, it has expanded into the economic domain, promoting resilience through domestic capacity building in sectors like semiconductors, pharmaceuticals, and clean energy. This perspective resonates with the statement from the European Political Strategy Center (EPSC, 2019), which argues that strategic autonomy is not about isolation but about developing the capacity to act independently when necessary (Borrell, 2020). This redefinition helps frame the EU's evolving industrial policy as a balance between cooperation and resilience. Amid arising geopolitical tensions, this narrative has started to be noticeable, advocating for increased domestic production, supply chain diversification, and regional cooperation to safeguard economic sovereignty and ensure long-term resilience.

Thirdly, the discussion about innovation economics underscores the role of technological advancement and knowledge creation as drivers of economic growth and competitiveness. In Central and Eastern Europe, fostering innovation through research, digitalisation, and supportive policies is vital for catching up with more developed EU nations and ensuring sustainable industrial development in a changing political landscape (Bonini, 2024). Another perspective highlights how institutional, policy, and interest group dynamics influence industrial strategies and economic outcomes. EU policies like the Green Deal and national reforms reflect negotiations between economic interests, political agendas, and geopolitical considerations,

shaping the distribution of resources and the trajectory of regional industrial development (Draghi, 2024).

Education policy is fundamental in equipping the workforce with the skills necessary for modern industries, digital transformation (Martens, 2025), and innovation. Particularly in Central and Eastern Europe, targeted skills development and vocational training are critical to bridging the technological divide (European Training Foundation, 2022). In the context of Europe's industrial resilience, fostering STEM education (World Bank, n.d.), vocational training, and lifelong learning is crucial for adapting to technological changes and supporting regional economic disparities. Furthermore, in line with the dimensions presented, we have the aspect of competitiveness in Europe's industry that seems to be linked increasingly to successful green and digital transitions. Embracing clean technologies, digital infrastructure, and innovation will determine the capacity of countries to remain competitive globally while meeting sustainability objectives, a process requiring massive capital allocation for resilience and renewal (European Investment Bank, 2023). For less developed CEE nations, investing in these transitions is key to avoiding stagnation and fostering long-term growth.

By bridging these frameworks, we allow for a nuanced exploration of how political will, economic structure, and institutional capacity shape the industrial trajectories, educational systems and structural capacities of individual EU countries. As a great support, the Strategic Technologies for Europe Platform (STEP) serves as a critical investment mechanism to sustain innovation and resilience (Kolesnichenko & Oosterwijk, 2024). However, challenges remain. Fiscal disparities between EU member states mean that wealthier countries like Germany and France are better positioned to capitalise on relaxed state aid rules, potentially exacerbating intra-EU inequalities. National responses vary. Germany and France have crafted coherent national industrial strategies aligned with EU objectives, while countries such as Romania and Bulgaria fall behind in strategy formulation and implementation. This divergence necessitates regionally tailored policy tools.

The evolution of industrial policy in the EU reflects an ongoing tension between market-based integration and more strategic forms of public intervention, as policymakers increasingly turn to industrial policy to address productivity, geopolitical fragmentation, and the green transition (Hodge et al., 2025). While earlier approaches emphasised competition and limited intervention, the shocks associated with the COVID-19 crisis exposed important vulnerabilities and pushed the European Commission to place greater emphasis on resilience, recovery, and open strategic autonomy (European Commission, n.d.). State-led approaches prioritise national or regional resilience, using public investment, subsidies, and regulatory frameworks to guide economic outcomes. This shift does not signify a return to protectionism per se but rather reflects a pragmatic response to global power realignments and market failures. Policies like the European Chips Act and the Critical Raw Materials Act that we introduced before in the paper exemplify how

state-led coordination aims to secure critical technologies and inputs, aligning with the strategic autonomy narrative. The cornerstone of long-term economic success lies in innovation. Countries that invest in R&D, foster dynamic ecosystems for start-ups and scale-ups, and link academia with industry consistently outperform in global competitiveness rankings (European Parliament, 2023). Innovation-driven growth enables economies to move up the value chain, improve productivity, and respond to environmental and digital transitions. Data from the European Innovation Scoreboard (European Commission, 2024b) reveals that CEE countries consistently fall behind Western European counterparts. We will dive more in-depth in the following chapters into the results that we found confirming these observations. The underperformance is tied to structural issues, including weak intellectual property systems, limited venture capital availability, and brain drain. Nevertheless, countries like Czech Republic show promise, demonstrating that targeted policies can yield results.

Effective industrial policy requires more than funding—it demands capable institutions to design, implement, and monitor strategic initiatives. Governance quality varies significantly across the EU, with CEE countries often facing challenges such as regulatory uncertainty (Shala & Perri, 2022), limited transparency, and politicised bureaucracies. Institutional capacity is thus an important mediating factor in translating EU-level policy into national success. Building public sector expertise, reducing corruption, and increasing administrative efficiency are essential for maximising the benefits of EU industrial instruments. There is an inherent tension between pursuing innovation-led growth and adopting protectionist policies. While strategic autonomy needs some level of intervention, excessive protectionism (Gunnella & Quaglietti, 2019) can suffocate competition, reduce efficiency, and lead to technological stagnation. The EU must therefore strike a balance that will offer space for supporting strategic sectors while maintaining openness to global markets and competition. In this context, innovation (Chivot, 2020; Cory, 2023) should not be seen as an alternative to protectionism (Ayesha Bhatti, 2025), but as its strategic counterpart. Building innovation ecosystems internally reduces reliance on external actors and increases the EU's global leverage without resorting to isolationism.

2. Methodology of research

Methodologically, the article addresses the challenge of linking EU-level industrial policy framing with heterogeneous competitiveness trajectories in CEE by combining qualitative analysis of policy documents with comparative indicators for five industrially central CEE economies. The key task is to make visible how discursive ambitions around strategic autonomy and twin transitions correspond, or fail to correspond, to measurable changes in growth, innovation, and human capital. The motivation behind this methodological choice lies in the complexity of the

subject—industrial transformation in the European Union under new political and economic conditions—which requires both statistical evidence and interpretive policy analysis. Our chosen typology of research allows for cross-validated insights drawn from more than just one method, ensuring greater reliability and explanatory power.

The empirical analysis focuses on five Central and Eastern European member states: Poland, Czech Republic, Hungary, Romania and Slovakia. These cases were selected because they constitute the industrial core of the CEE region in terms of manufacturing value added, integration in European value chains (especially automotive and electronics), and volume of received cohesion and recovery funds. They are also comparable in terms of EU accession wave and macro-regional positioning (Visegrád group plus Romania), which allows a more coherent assessment of how EU-level industrial instruments interact with similar historical legacies and structural constraints. Other CEE member states (Baltic states, Slovenia, Croatia, Bulgaria) were not included due to their smaller industrial base or distinct economic profiles. We acknowledge this aspect as a limitation and an avenue for future research.

The qualitative component of the study focuses on an in-depth analysis of strategic policy documents, institutional frameworks, and ideological paradigms driving industrial change in the EU. The research uses a purposive sampling strategy focusing on EU-level and national documents that explicitly address industrial policy, competitiveness, and the green and digital transitions between 2020 and 2025. The corpus includes four flagship EU strategies (Green Deal Industrial Plan, Net-Zero Industry Act, Critical Raw Materials Act, European Chips Act), five national industrial or competitiveness strategies (one for each of Poland, Czech Republic, Hungary, Romania and Slovakia) and selected analytical reports from Bruegel, CEPS and the European Policy Center that interpret these instruments in the CEE context (Bruegel, 2026).

At the national level, the corpus draws on country-specific assessments and official reports, including the European Commission's Country Reports for Romania (2023, 2024), the OECD Economic Survey for Romania (2024), the EBRD Romania Country Strategy 2025–2030 (2025), the Ministry of Finance of the Slovak Republic's Annual Progress Report (2025) and the U.S. Department of State Investment Climate Statement for Slovakia (2024), complemented by EU-level strategy documents applicable to all five countries.

Documents were coded using a mixed deductive–inductive approach. Deductive codes were derived from the theoretical framework (“competitiveness,” “strategic autonomy,” “institutional capacity,” “human capital”), while inductive codes captured recurring themes emerging from the texts (“two-speed Europe,” “FDI dependency”). Coding was conducted manually, with iterative comparison across EU-level and national documents to identify convergences and divergences in how industrial challenges and policy responses are framed.

The quantitative analysis assesses industrial, economic and educational performance indicators across five Central and Eastern European countries (Poland, Czech Republic, Hungary, Romania, and Slovakia) with comparative references to the EU average. The period under review spans from 2022 to mid-2025, enabling a timely understanding of post-pandemic recovery, geopolitical shocks (such as the war in Ukraine), and evolving EU policy responses.

The qualitative coding of EU and national documents identifies how policy-makers frame key challenges (e.g. FDI dependency, skills shortages, innovation gaps). These themes are then systematically compared with the quantitative indicators for each country: for example, discourses emphasising high-value manufacturing and innovation finance in the Czech Republic are juxtaposed with its relatively high R&D expenditure and innovation rankings, whereas narratives on governance bottlenecks in Romania and Hungary are contrasted with lower scores on competitiveness and trust in institutions. This structured comparison allows us to trace how discursive expectations do—or do not—align with empirical performance across the five CEE economies.

To operationalise “industrial competitiveness” in a way that is empirically tractable yet multidimensional, we selected indicators capturing three complementary dimensions: macroeconomic performance and openness (GDP growth, FDI inflows), innovation capacity (R&D expenditure as % of GDP, Global Innovation Index ranking and European Innovation Scoreboard indicators), and human capital (tertiary attainment, STEM graduates per 1,000 inhabitants, public education spending). These indicators are widely used in the comparative competitiveness literature and by international organisations (EU, OECD, World Bank, WEF) as proxies for a country’s ability to upgrade its industrial structure and sustain productivity growth. Rather than aggregating them into a single composite index, we employ a comparative pattern-analysis approach: indicators are examined jointly to identify clusters of countries (high growth/high innovation vs low R&D/low value-added trajectories) and to explore how these patterns align with the qualitative findings on policy framing and institutional capacity (World Bank, 2023b).

Furthermore, to mitigate size effects, absolute FDI inflows are complemented by relative measures (FDI as a share of GDP and, where available, FDI per capita and sectoral composition), allowing a more meaningful comparison between larger economies such as Poland and smaller ones such as Slovakia.

The study follows a sequential explanatory mixed-methods design. First, the qualitative analysis of EU and national policy documents identifies how industrial challenges, competitiveness, and strategic autonomy are framed at different governance levels and what expectations are articulated for CEE countries, addressing the first research question. Second, quantitative indicators are used to assess whether and to what extent the five CEE countries exhibit competitiveness patterns consistent with these expectations across 2022–2025, addressing the second research question. The Discussion section integrates both strands by comparing

discursive ambitions with empirical trajectories, thereby elucidating the mechanisms through which institutional and human-capital factors condition the translation of EU industrial instruments into national outcomes. This methodology ensures that the article does not merely describe policy trends but provides evidence-based evaluation of industrial competitiveness and institutional readiness for the twin transitions: green and digital. The inclusion of educational metrics further reinforces the interdisciplinary character of the research, acknowledging that human capital is an indispensable enabler of industrial transformation.

3. Discussions and results

These five countries chosen for the present study (Poland, Czech Republic, Hungary, Romania and Slovakia), also often called CEE (Central and Eastern European countries), represent a critical industrial backbone of the EU. They are deeply integrated into Europe's manufacturing and export networks, particularly in automotive, electronics, and energy-intensive industries, yet they face distinctive structural challenges compared to Western Europe (GIVE Consulting, nd.). These include rising labour costs, demographic decline, overdependence on foreign investment, and lower innovation capacity. At the same time, they stand at a strategic crossroads: they are key recipients of EU cohesion and recovery funds, major sites for offshoring (nearshoring) in global supply chain reconfigurations and increasingly targeted by large-scale investments in green and digital transitions. Examining their strengths and weaknesses in competitiveness and industrial policy offers a unique lens into how EU-level strategic goals such as innovation, decarbonisation, and security can be translated or obstructed at the national level. Studying this specific group allows for a better comparative analysis and proper insights, scalable and directly aligned with the broader objectives outlined in the EU's 2024–2025 competitiveness strategy. The “Competitiveness Compass for the EU” was introduced in 29th of January 2025, by the European Commission under an official Communication guide. It is based on the report by Mario Draghi, and it lists priority actions needed to be taken in the next five years.

The following table includes information regarding Poland, Czech Republic, Hungary, Romania and Slovakia, with data updated from 2024–2025, where we can observe the progress and the gaps in regional industrial capacity (Table 1).

Table 1. Key competitiveness indicators in five CEE countries and the EU average, 2024–2025

Country	GDP Growth (2025)	FDI (€B)	Innovation Rank	Competitiveness Rank	R&D (% GDP)
Poland	3.2%	€15.0	40th	41st	1.45%
Czech Republic	2.0%	€10.2	30th	29th	1.96%
Hungary	1.5%	€10.0+	36th	54th	1.39%
Romania	0.2%	€8.5	48th	50th	0.50%
Slovakia	1.4%	€6.2	46th	59th	0.98%
EU Average	~0.9%	€475.0	—	—	2.22%

Note: author's calculations based on Eurostat (GDP growth), UNCTAD (FDI inflows), European Innovation Scoreboard 2024 (innovation ranks), World Economic Forum Global Competitiveness Index 2023–2024 (competitiveness ranks), and Eurostat/OECD (R&D expenditure as % of GDP).

Source: author's representation

3.1. Macroeconomic performance and FDI dynamics in CEE

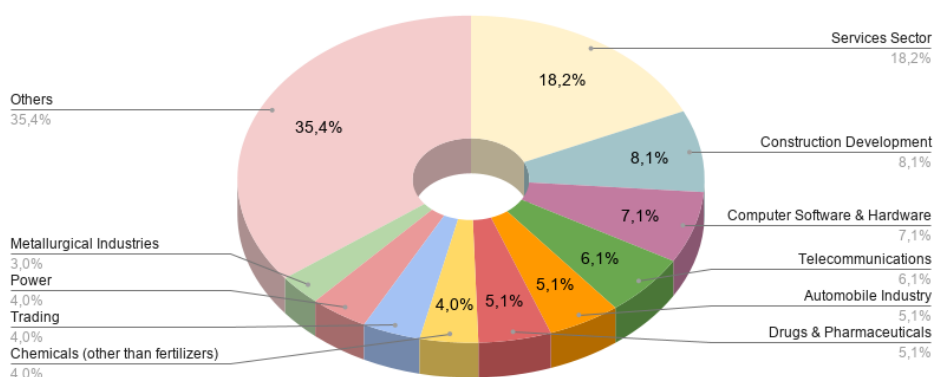
Regarding GDP growth (Gross Domestic Product), in 2023, Romania's GDP growth was about 4.5% (European Commission, 2023; Eurostat), reflecting strong recovery and resilience in sectors like IT, manufacturing, and agriculture. During the same year, Poland was at around 4.0% (World Bank, 2023a) driven by strong consumer spending and industrial output, whilst Czech Republic experienced a 2.4% growth (according to the Czech Statistical Office) with a rebound in export industries. As Hungary showed a growth rate of around 3.0% in 2023, with significant contributions from the automotive sector, Slovakia's growth was 1.4% (Worldometer, n.d.), a slow, steady increase with 0.93% from 2022. However, later, the GDP growth was affected by factors such as supply chain disruptions and increased energy prices due to Russia's invasion of Ukraine. (Macrotrends, n.d.) The negative developments come with the latest indicators results from 2025, which have put Poland at a 3.2% growth rate and the other countries consequently lower (Trading Economics, n.d.).

Regarding the FDI indicator analysed in the data collected from the FDI reports (FDI, 2023), two countries emerge, with funds as high as €13 billion in inflows in 2023 for Poland and €10 billion in 2023 for Czech Republic. Romania comes third with an inflow of €7 billion, particularly in the IT, manufacturing, and energy sectors, followed by Hungary with €5.8 billion in high-tech industries and automotive manufacturing. Slovakia dropped last with not much more than \$180 million in FDI in 2023 (Lloyds Bank, 2026), a substantial decrease compared to the \$2.9 billion in 2022. The latest period, 2024–2025, highlights Poland with an inflow of €15.0 Billion, followed by Hungary with over €10 Billion—driven largely by

Asian capital (Hungarian Investment Promotion Agency, 2025)—and Czech Republic with €10.2 Billion. Romania follows with €8.5 Billion (National Bank of Romania, 2024) and Slovakia with €6.2 Billion (UNCTAD, 2025). In general, the sectors that attract the highest FDI equity inflows in EU countries are the Services Sector, Construction Development and Computer Software & Hardware (Figure 1), while other sectors are not to be neglected either. A relevant visual representation will furthermore enlighten the perspective. To ensure comparability, we interpret these absolute FDI inflows alongside relative measures (FDI as a share of GDP and, where available, sectoral breakdowns), recognising that a given inflow carries different macroeconomic weight in Poland than in Slovakia. Where discrepancies appear between commercial aggregators and official sources, we prioritise Eurostat, UNCTAD and national balance-of-payments statistics.

Figure 1. Sectors attracting highest FDI in EU in 2024

Percentage of Sectors Attracting Highest FDI Equity Inflows



Note: Author's representation based on Polish Investment and Trade Agency [PAIH](2024) FDI sector statistics for Poland, National Bank of Romania (2024) FDI by sector report, and HIPA (2024) FDI project database. Data refer to equity FDI inflows by sector in 2024; percentages show sectoral shares of total FDI inflows in each country

Source: author's representation

Both the quantitative and qualitative data observed show the following trends: economic growth is robust across these countries, though disparities remain. Poland (~3.2 %), Czech Republic (~2.0 %), and Romania (~0.2 %) are seeing solid growth rates, with Poland leading, while Hungary remains behind, showing stagnation or near-zero growth. Slovakia is projected to grow at approximately 1.4–1.5% in 2025,

up from about 2.1 % in 2024, dropping below regional peers. Growth is supported by domestic consumption and EU funding but is constrained by weak exports and slow automotive expansion.

FDI inflows are strong in all countries, but Poland (€15 B) and Czech Republic (€10.2 B) are leading in attracting strategic investments in tech and green industries. Romania (€8.5 B) and Slovakia (€6.2 B) also attract capital, but less so in cutting-edge fields. Hungary, despite struggling with low GDP growth, attracts over €10 Billion in FDI, strongly heavily tilted towards Asian investments in electric vehicle (EV) supply chains (Hungarian Investment Promotion Agency, 2025). For Slovakia, while official 2025 inflow numbers are pending, gross inflows were substantial in 2024—approximately 2.4% of GDP, with major new automotive projects planned, including the state-supported Volvo EV plant. The country implemented a Foreign Investment Screening Act in 2023, but no investments were blocked, signalling an open yet regulated FDI policy aimed at security without deterring inflows. This reflects FDI marched directly and asymmetrically toward advanced manufacturing and energy transitions in the regional leaders.

Table 2. Competitiveness indicators corelated with three levels (low, moderate, robust) in Poland, Czech Republic, Romania, Hungary and Slovakia

Trend	Poland, Czech Republic, Romania	Hungary	Slovakia
GDP Growth (2025)	Robust (~2–3%)	Low (1.5%)	Moderate (~1.4–1.5%)
FDI Inflows	Strong, tech–green focus	Strong Asian FDI (€10.0+B)	Substantial (2.4% GDP in 2024; EV projects)
Innovation Rank	Czech Republic highest (~30th)	Romania/Hungary low	~46th—low gap output/input; R&D <1% GDP
Competitiveness Rank	Improving, but below West	Hungary lags (~54th)	Lowest among peers; structural constraints

Source: author's representation

Competitiveness indicators show that while CEE countries are improving, they are still falling behind Western European counterparts on infrastructure, education and innovation systems. IMD or WEF rankings confirm that Czech Republic leads (29th) (Table 2), with Slovakia (59th), Hungary (54th), Romania (50th), and Poland (41st) further back. For Slovakia specifically, structural weaknesses persist. Infrastructure, education quality, and innovation-to-market mechanisms remain below Western European standards. Slovakia's external vulnerability, such as a heavy reliance on automotive exports and low digital readiness, particularly weighs on its competitiveness, especially within the EU context. All five countries close the gap with Western Europe, but challenges across

infrastructure, high-skilled labour, and diversified innovation systems remain—notably in Slovakia and Hungary (Ministry of Finance, 2025).

3.2. Human capital, education, and innovation capacity

Along these lines, we have observed that Education is a valuable perspective worth taking into consideration; we integrated the present indicators showcasing the role of education in enhancing industrial competitiveness. We believe that education is not only a social good but a strategic enabler of innovation and productivity.

On the other hand, the importance of Education in Industrial Competitiveness is of outstanding relevance. Education stands as a foundational pillar of industrial competitiveness in Central and Eastern Europe, where countries like Czech Republic and Poland leverage strong PISA performance, high tertiary enrolment (Trading Economics, 2026), and targeted upskilling policies to sustain innovation-driven industry. On the opposite pole, Hungary, Romania, and Slovakia face structural challenges such as underfunded R&D systems, regional disparities in education quality, and slow transitions from education to high-value employment, ultimately shaping countries' capacities to adapt to digital, green, and high-tech industrial transformation. In terms of numbers, although Poland (4.7%), Slovakia (4.4%), and Czech Republic (4.6%) allocate significant portions of their GDP towards education, they still fall slightly below the EU average of 5.0%. Romania remains an extreme outlier at just 2.9%, indicating a severely underfunded education system. Poland performs well in tertiary attainment (or post-secondary attainment - it refers to the completion of education beyond the secondary school level, such as college or university degrees, vocational training, or other post-secondary qualifications), but other CEE states remain behind the EU's benchmarks, with Romania the most behind. Slovakia and Romania spend the least on education as % of GDP, correlating with their poor attainment and STEM performance. All CEE countries underperform in the STEM graduate share, a core concern for industrial modernisation. Improving education is essential (Eurostat, 2024), not only through increased investment but also structural reforms in STEM curricula and vocational training (Table 3).

The Global Innovation Index 2024, published by WIPO in late 2024, is the latest available as of mid-2025. Among the CEE countries, Czech Republic ranks highest (30th), possibly benefitting from upgrades in higher-value manufacturing and tech infrastructure. Romania (48th) and Slovakia (46th) are taking place behind but still within the top 50 globally, positioning them as emerging innovation economies in Europe. Past rankings put Romania at number 47th in the European Innovation Scoreboard (European Commission, 2023b), with strengths in IT and digital services but challenges in R&D investment. Poland, 39th in rank, reflects strong growth in innovation capacity, particularly in IT and clean tech, and shows a close position to Hungary (42nd) with improvements in digital infrastructure and emerging tech industries, but struggles in R&D funding. As a winner, we have Czech

Republic ranked 28th, showing solid performance in the manufacturing sector, industrial design and technology (European Commission, 2023b; 2024; 2024c).

Table 3. Data regarding GDP Growth and other three indicators (Tertiary Education, STEM Graduates, Public Education Spending) in the five countries of the study in relation to EU's average during 2024-2025 period

Country	GDP Growth (2025)	Tertiary Education (25–34, %)	STEM Graduates/1,000	Public Education Spending (% GDP)
Poland	3.2%	48.1%	~14.5	4.7%
Czech Republic	2.0%	35.0%	~13.8	4.6%
Hungary	1.5%	34.1%	~12.6	4.2%
Romania	0.2%	23.6%	~9.4	2.9%
Slovakia	1.4%	36.4%	~10.1	4.4%
EU Avg.	~0.9%	44.7%	~15.2 (World avg.)	~4.9–5.1%

Note: data from Eurostat, UNCTAD DataBank.

Source: author's representation

Between 2023 and 2024, we have noticed notable changes in the rankings from the GCI (Global Competitiveness Index). Romania's GCI rank in 2023 was 49th, improving in areas like infrastructure but needing further development in business dynamism. In 2024, it dropped to the 50th place, showing a lot of room for improvement. Hungary started in the 47th place on the GCI in 2023, showing challenges in social infrastructure and public health but strengths in industry. The latest index shows Hungary in 54th place, a lot lower than its position one year prior, falling back behind Romania. Poland ranked 41st on the GCI, with progress in digital infrastructure and innovation, but a need for improvements in macroeconomic stability, falling to 52nd place, just between Romania and Hungary. The best surprise came from Slovakia, starting initially in 59th place and climbing the ranks ultimately to 46th place, above its CEE group. All four trailing states underperform, relative to Northern/Western European states, reflecting persistent weaknesses in business efficiency, infrastructure, and policy framework. The top country from the group of five is unequivocally Czech Republic, with a 34th place on the GCI in 2023, with a robust industrial sector and strong education system, driving competitiveness. Czech Republic had historically reached 25th place in 2025, having hovered around 32nd to 35th in previous years. As it stands out in the region, consistently outperforming its CEE peers via strong government efficiency and institutional credibility.

Innovation systems across these countries show a need for improvement, especially in R&D investments. Czech Republic performs best, while Romania and Hungary have significant gaps. Slovakia trends toward the lower end of innovation

performance, reinforcing the broader R&D investment shortfall across the region as it ranks closely aligned with Romania and Hungary, suggesting low innovation output versus input scores. Slovakia's gross R&D expenditure is under 1% of GDP, reflecting persistent structural limitations in scaling domestic innovation, well under the EU average (~2.2 %) and growth targets. State R&D funding is under 0.4 % of GDP, aimed to rise to 0.67 % by 2030.

Tracking these rankings in 2023–2025 provides insight into how each country translates EU-level ambitions (innovation, industrial advancements, green transition) into measurable national competitiveness performance (Darvas, 2025). Czech Republic's relative success is instructive for policy alignment and governance reform, while the others offer contrasting cases on how structural inefficiencies, institutional limitations, and strategic coordination gaps continue to suppress competitiveness potential.

3.3. Structural dependencies, industrial models and country profiles

Since the 1990s, CEE economies have undergone rapid transformation, from post-communist restructuring to integration into EU markets. However, they often served as low-cost manufacturing hubs for Western multinationals, which led to a dual dependency: technological and investment based. This left CEE countries vulnerable to both supply chain disruptions and policy shifts in core EU economies. These economies are still viewed as subcontractors of Europe's industrial engine, highlighting the structural imbalance that continues to define industrial development in the region. The COVID-19 crisis and geopolitical tensions have made such dependencies increasingly untenable.

The changing industrial landscape of the European Union presents both opportunities and challenges for CEE countries. Historically peripheral in the EU's industrial core, these countries now face a unique moment to reposition themselves as competitive and strategic actors within the Union's evolving economic architecture. As the EU pushes for resilience, green transition, and technological sovereignty, CEE nations must address internal limitations while leveraging new openings in policy and investment. Also, the EU's emphasis on strategic autonomy affects how CEE countries are externally and internally perceived. The region's proximity to Ukraine and Russia, along with their transatlantic orientation, positions CEE states as vital players in Europe's security-industrial complex. NATO's eastern flank is heavily dependent on these countries, and increased defence-related manufacturing could become a key growth sector. Not just a border for Europe, but the region is the front line of the EU. Defence-industrial cooperation, cybersecurity investments, and logistical enhancements are increasingly becoming part of the industrial strategy in CEE states. Moreover, CEE countries are essential to EU energy diversification goals. Europe reduces dependency on Russian energy; CEE

states could benefit from their geographical positioning and resource management capacities.

Regarding other Indicators, Poland can be described in a few words as diversified with an export-driven manufacturing base. Poland benefits from strong industrial clusters and Special Economic Zones that attract German firms and boost exports, which account for ~30% of GDP. Other strengths would be relatively low wages and solid education support that offers opportunities for cost-competitive manufacturing and foreign investment. In 2024, the competition authority (the Office of Competition and Consumer Protection - UOKIK) issued 326 merger decisions and investigated digital markets and automotive cartels, a powerful authority in this sense. Some weak sides of the country would be the procurement processes that are known to be lengthy, attract few bidders, and limit innovation in procurement. Therefore, manufacturing remains weak even if the level of production has increased slightly. As the ageing population increases and the workforce power decreases, the rising costs threaten Poland's export-led model if a structural reform and energy transition are not taking place soon.

For Czech Republic, the situation is a little bit different. The country tops regional UNIDO (United Nations Industrial Development Organisation, 2024) rankings in manufacturing output and technology upgrading, and solid investments are expected to stay strong as EU financing conditions have improved lately. The newly adopted strategies emphasise high-value manufacturing, innovation financing, infrastructure, and human capital. The uptrends have downtrends, however, as well. Czech Republic ranked as low as 27th place in the EU innovation procurement policy score during 2023-2024, as the corruption issues persist and public perception remains negative. Wage growth and service inflation remain stagnant, necessitating restrictive monetary policy to move forward.

With Hungary, we see a strong shift in industrial manufacturing, emerging in the EV (electric vehicles) sector. As it hosts major Chinese and BMW plants (BYD, CATL, BMW) initiating EV and battery production starting from 2025, Hungary can become a pioneer of Europe's EV industry. Ranked as a moderate innovator, the country establishes itself as a force with strong R&D inflows, high patent activity and a skilled research workforce. While there might have been a slowdown in growth in industrial production, it did not actually decline, but the growth rate was reduced in key sectors. There are, however, some key points that are a little more concerning, like the GDP growth that is projected to be around 1.5% in 2025, seeing a weak need in export demand. In this case, high deficits limit stimulus that triggers a fragile investment climate, which underlines the risk of great concerns regarding the government's poor rule of law. In this case, a corruption problem undermines investor confidence, making it a huge problem. More than that, overreliance on politically motivated FDIs (Foreign Direct Investment) from Chinese EV firms further blocks the development of the infrastructure that is desired to be developed through EU funds.

In recent years, Romania has maintained relatively robust growth, supported by strong domestic demand and high levels of investment financed by EU funds and foreign direct investment (FDI), even as external imbalances widened and fiscal deficits remained elevated (European Commission, 2023h, 2024h; SEV, 2023; Hunya, 2023; OECD, 2024). EU-financed investment and FDI are estimated at around 4% of GDP each in 2023–2024, suggesting sizeable potential for continued absorption of Recovery and Resilience Facility resources and cohesion-policy funds, provided that implementation capacity and governance improve (Hunya, 2023; European Bank for Reconstruction and Development [EBRD], 2025). Romania's economy is deeply integrated into European value chains: in 2023–2024, roughly 72–73% of its exports were directed to EU partners (Tendata, 2026), which underlines both strong market access and a relatively concentrated geographical export structure (Lloyds Bank, 2026). At the same time, European Commission and OECD assessments highlight persistent structural reform gaps, weak innovation performance and administrative capacity constraints, contributing to a large current account deficit—financed to a significant extent by capital inflows—and public finances that remain under pressure (European Commission, 2023, 2024; OECD, 2024; SEV, 2023). Looking ahead, many analysts argue that Romania's ability to sustain convergence will depend on using EU funds and FDI to raise domestic value added, strengthen institutions and reduce macro-financial vulnerabilities (EBRD, 2025; Hunya, 2023).

Slovakia, in turn, has positioned itself as a key automotive hub in Central Europe, with the European Commission approving up to €267 million in Slovak state aid in 2024 for a new Volvo Cars electric-vehicle plant, foreseen to reach a production capacity of about 250,000 EVs per year later in the decade (European Commission, 2024c; Reuters, 2024). OECD work on global value chains shows that Slovakia's export model is heavily specialised in automotive and electronics manufacturing, often in downstream segments with relatively low domestic value added and high import content, which raises concerns about over-reliance on a narrow industrial base (Hanzl-Weiss, 2023; Hunya, 2023; OECD, 2019; Török, 2022). The competition framework (Lianos, 2019) is anchored in EU law and enforced by the Anti-Monopoly Office of the Slovak Republic, which reviews mergers and addresses anti-competitive practices in sectors including energy and telecommunications (U.S. Department of State, 2024). Macroeconomic assessments point to fiscal pressures and recent episodes of high inflation alongside a tight labour market, implying distributional and regional challenges even as investment and exports support growth (International Monetary Fund [IMF], 2023; OECD, 2019; Hanzl-Weiss, 2023; Hunya, 2023). Trust in public institutions is comparatively low: in the OECD Survey on Drivers of Trust in Public Institutions, only 31% of Slovak respondents reported high or moderately high trust in the national government in 2023, well below the OECD average (OECD, 2024b). In the digital domain, EU monitoring through the former Digital Economy and Society Index (DESI) and the

newer Digital Decade reports stresses the need to further develop broadband infrastructure, digital public services and skills in Slovakia and other EU member states (European Commission, 2021, 2023a, 2025). Taken together, these findings suggest that Slovakia's future competitiveness will hinge on using EV-related and other green investments to diversify beyond assembly-intensive exports while reinforcing institutions, competition policy and digital capabilities (Hanzl-Weiss, 2023; OECD, 2019).

CEE countries present a complex picture. While they have benefitted from decades of integration into European value chains, their role has often been peripheral: hosting assembly plants rather than innovation hubs. This historical dependence on low-cost labour and foreign investment has resulted in economic growth but also structural vulnerabilities. Governance challenges, underinvestment in R&D, brain drain, and energy dependence continue to hinder long-term competitiveness. Countries like Poland and Czech Republic have shown signs of transition towards higher value-added industrial models, while Romania and Hungary remain more reliant on traditional sectors. Therefore, we must consider all these realities when designing EU-level policies, as one-size-fits-all approaches may fail to achieve inclusive industrial development.

3.4. EU Industrial policy alignment and future scenarios for CEE

We would like to emphasise the key EU policies and their alignment with the CEE countries' needs and capacities. First, Romania's national industrial strategy has prioritised the IT and clean tech sectors, aligning with the EU's Green Deal goals. However, challenges in governance and innovation ecosystems remain. Poland has embraced a proactive industrial strategy, focusing on green energy and the automotive sector. However, concerns about bureaucracy and the slow adaptation of digital technologies still stand. Czech Republic's industrial strategy is strongly aligned with EU objectives, focusing on digitalisation, R&D, and sustainability. However, issues like a talent shortage in high-tech sectors are notable. Hungary has made significant progress in the automotive sector, but its industrial policy is often criticised for being inconsistent with EU-wide objectives, particularly in terms of digital transition and green tech. Slovakia, while increasingly involved in the EV transition (highlighted by the state-supported Volvo EV plant), faces structural weaknesses such as low R&D intensity, overdependence on automotive exports, and slow digital innovation. Its industrial policy aligns nominally with EU decarbonisation goals, but limited investment in high-tech sectors and skills development remains a barrier to competitiveness.

Furthermore, another important aspect is that the concept of a "Two-Speed Europe" is not new, but in the context of industrial policy, it has gained renewed relevance. Multi-speed Europe or Two-Speed Europe (also called "variable geometry Europe" or "Core Europe" depending on the form it would take in practice)

is the idea that different parts of the European Union should integrate at different levels and pace depending on the political situation in each individual country. The gap between Western and Eastern member states in terms of innovation capacity, governance, and economic complexity is increasingly evident. Wealthier member states have more fiscal space to support their industries through state aid and innovation funding. Without stronger EU-level redistributive mechanisms, CEE countries may fall further behind. For the industrial divide between Western and Eastern Europe to be resolved, funding and policy coherence should be prioritised. This reinforces the need for continued cohesion policy instruments and an industrial strategy that actively addresses regional disparities. Countries with stronger fiscal capacities can deploy national subsidies and attract private investment more effectively, while less-developed economies may struggle to match this pace. Moreover, private investment in R&D remains disproportionately low in CEE. According to Eurostat data on tertiary educational attainment (European Commission, 2024d, 2024f), while Germany and Sweden invest over 3% of GDP in R&D, most CEE countries remain below 1.5%. Encouraging public-private partnerships and establishing innovation clusters around universities and tech parks are crucial strategies moving forward. Without targeted support and structural reforms, EU industrial policy risks reinforcing existing asymmetries. A coherent European approach must recognise and address these disparities to ensure that industrial transformation does not lead to further fragmentation.

To succeed in the new industrial age, CEE countries must accelerate their digital transformation agendas. The EU Digital Compass (European Commission, 2021) sets ambitious targets for digital infrastructure, cybersecurity, and skills training. Good practices examples like Lithuania and Estonia, which have invested heavily in e-governance and tech ecosystems, show a significant example of a possible transformation. In this case, CEE states must act quickly. It has been thought that digitalisation is the new frontier of productivity, and those who remain behind today will struggle to compete tomorrow. CEE countries must therefore treat digital transformation not as an optional goal but as a core pillar of industrial competitiveness. Another opportunity lies in regional cooperation among CEE countries. Cross-border industrial clusters, joint R&D projects, and regional supply chain networks can help these countries pool resources and amplify their industrial voice in EU policymaking. CEE countries must think beyond national interests. Regional integration is the key to leveraging their collective potential. By collaborating, CEE nations can better position themselves within pan-European industrial strategies, lobby for equitable funding, and develop economies of scale in emerging sectors such as green hydrogen, robotics, and biotech.

Despite these structural weaknesses, the current wave of EU industrial policy reforms may create a strategic opening for CEE countries. The EU's push for nearshoring, digitalisation, and green manufacturing could decentralise investment flows that traditionally favoured Germany, France, and the Netherlands. Initiatives

like the Strategic Technologies for Europe Platform (STEP) and the Recovery and Resilience Facility (RRF) can catalyse industrial modernisation if CEE countries adopt forward-looking strategies. Cohesion is not just a principle; it's a policy imperative. The green and digital transitions must benefit all regions, or they risk dividing Europe. Therefore, it is essential to evaluate and adapt industrial policies, especially in regions with weaker infrastructures, since the successful transition to Industry 4.0 in the CEE block fundamentally depends on improving technological readiness, governance, and regional cooperation (Naudé et al., 2019). National-level shifts are already visible; for example, Poland has begun positioning itself as a hub for battery manufacturing and electromobility. Similarly, Romania, although facing administrative and governance hurdles, has the potential to develop its semiconductor and IT sectors with targeted investment and policy alignment. These efforts are critical to ensuring that CEE doesn't remain on the periphery of the new industrial age.

In this context, cohesion policy becomes the key mechanism for preventing a "Two-Speed Europe" in industrial development. Without stronger, targeted EU support for upgrading institutions, innovation systems and human capital in CEE, the green and digital transitions risk deepening existing divides between core and peripheral economies. A more territorially sensitive industrial strategy—linking EU-level tools (such as cohesion funds, STEP and RRF) to national reform commitments—would help ensure that CEE countries move from assembly platforms to full participants in European value creation, reinforcing both convergence and the long-term legitimacy of the integration project.

Conclusions

The European Union's industrial landscape is undergoing a profound transformation, one marked by the pursuit of resilience, sustainability, and strategic autonomy. For Central and Eastern European (CEE) countries, this moment represents more than a policy shift; it is a generational opportunity to reposition themselves within the industrial core of the EU. To fully capitalise on this opportunity, CEE states (Poland, Czech Republic, Hungary, Romania and Slovakia) that were the object of our research must go beyond merely aligning with EU strategies. They must actively shape them. This calls for a dual transformation: addressing internal structural weaknesses while leveraging external strategic openings. Strengthening governance, boosting innovation ecosystems, and fostering institutional reforms are critical prerequisites for this shift. Simultaneously, enhancing public administration capacities will enable more effective policy design and execution. One of the most potent levers of transformation is education. By modernising educational systems and integrating them with industrial needs, through dual education models, university-industry partnerships, and regional innovation hubs, CEE countries can build the human capital necessary for long-term

competitiveness. Investment in critical technologies and research infrastructure must be paired with efforts to localise capabilities and reduce dependency. Furthermore, equitable access to EU resources and well-managed cohesion funding remains essential for addressing fiscal disparities and unlocking regional potential. Strategic coordination, not only between EU and national governments but also across the CEE region itself, will be vital in fostering inclusive growth and shared technological sovereignty.

This research set out to critically examine the European Union's evolving industrial strategies under the pressures of geopolitical fragmentation, technological disruption, and climate transition. It has also assessed their impact on competitiveness using measurable indicators (GDP growth, FDI, R&D spending, competitiveness index, education and innovation performance) while placing a particular emphasis on the positioning and readiness of five Central and Eastern European (CEE) countries: Poland, Czech Republic, Hungary, Romania, and Slovakia.

Our findings show that although the EU's strategic industrial framework (including instruments like the Green Deal Industrial Plan, the Critical Raw Materials Act, and the European Chips Act) aims to enhance Europe's autonomy and long-term resilience, it disproportionately benefits member states with stronger innovation ecosystems, such as Czech Republic or Poland, with higher absorptive capacity and mature governance, but it is of disadvantage for countries like Hungary, Romania or Slovakia. The comparative analysis reveals persistent gaps in institutional readiness, investment in R&D, and educational attainment not just between the five countries but also between them and their Western European counterparts.

Strengthening national governance and implementation capacity ensures that EU strategies can be translated into effective local action. From another perspective, enhancing R&D funding and innovation ecosystems to support long-term value creation and attract talent will help build regional industrial clusters that connect academia, industry, and government across borders. Regarding funds, improving the absorption and strategic use of EU funds, which remain underutilised in many CEE countries due to institutional and administrative constraints, will help create a capable and professional working force. Investing in digital infrastructure and green skills will equip the workforce to thrive under the twin transitions of digitisation and decarbonisation.

The critical gap this study addresses is the lack of alignment between EU-level industrial ambitions and the practical, institutional, and demographic realities of its eastern member states, with attention to Poland, Czech Republic, Hungary, Romania and Slovakia. While EU policy discourse increasingly emphasises inclusiveness and strategic autonomy, implementation lags in regions that most need support. The conclusions of the analysis underline a clear hierarchy: while Czech Republic and Poland converge faster towards EU innovation and competitiveness benchmarks,

Romania, Hungary and Slovakia remain trapped in low R&D, low-value-added trajectories despite substantial FDI inflows. Our conclusion reinforces that without boosting administrative capacity, enhancing local innovation ecosystems, and countering talent outflows, the goal of a competitive and cohesive European industrial future will be difficult to attain.

In sum, the EU's evolving industrial architecture offers a compelling blueprint for long-term competitiveness and resilience. Still, its success will ultimately depend on bridging the implementation gap, especially in the Central and Eastern European region. Only through tailored support, policy coordination, and inclusive governance can the EU ensure that no member state is left behind in the pursuit of a stronger industrial future.

Countries in Central and Eastern Europe (CEE) stand at a critical crossroad in the transformation of Europe's industrial landscape. Through deeper regional cooperation, sustained investment in innovation and human capital, and a more proactive role in policymaking, they have the potential not only to accelerate their convergence with Western Europe but also to emerge as active contributors to the continent's industrial and strategic development. This process entails meaningful participation in shaping a more competitive, cohesive, and strategically autonomous European Union. Achieving these objectives will require long-term vision, coordinated action, and effective implementation. In this context, Poland, Czech Republic, Hungary, Romania and Slovakia should not be perceived merely as recipients of external investment, but increasingly as co-creators of Europe's industrial future.

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