



Eurasian
Development Bank

The Architecture of Industrial Transformation in Developing Economies



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THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION IN DEVELOPING ECONOMIES

KEY FINDINGS

ANALYTICAL REPORT 26

1. A domestic industrial base helps developing economies reach high-income status

34 economies

moved from middle-income to high-income status between 1990 and 2023.

The rest — 108 — have been stuck in “the middle-income trap”



64%

of growth episodes over the past 50 years were linked to industry



53%

of global R&D activity is accounted for by manufacturing



nearly 60%

of green patents in 2023 were held by industrial companies



2. Lessons from history and theory



Markets and scale

Industrialisation requires demand from domestic, regional or global markets



Infrastructure and capital

A successful transition requires energy, water, logistics and long-term finance



Human capital

Mastering technology requires skilled workers and engineering expertise



Competition and market discipline

Growth is sustainable when firms prove competitive in domestic and export markets

History + theory



an architecture for a feasible industrial transition



Structuralism

Transform the structure of production, rather than simply expand output



The big push and linkages

Infrastructure and coordination set industrial upgrading in motion



New structural economics and the product space

Diversify into related activities within reach



Modern industrial policy and the feasibility framework

Support must be realistic, competitively allocated and verifiable

Industry → Learning by doing → Productivity growth → Engineering capabilities → Homegrown innovation

3. The solution: a three-stage architecture illustrated by the Eurasian region

1 Core industrial base

1i — investment



infrastructure



basic processing



broad-based skills

✓ Stable output

2 Industrial platform

2i — technology infusion



machinery, chemicals, metallurgy, agribusiness



suppliers and engineering



standards and long-term finance

✓ Technology adaptation

3 Knowledge economy

3i — innovation



R&D and pilot projects



new products



commercialisation

✓ Homegrown technologies



Human capital

Workers and technicians

Engineers and technologists

Researchers and design engineers



Other cross-cutting dimensions

Physical infrastructure

Soft infrastructure

Multilayered financial architecture

Institutions

Industry is the foundation of lasting sustainable development: it builds human and technological capital



Eurasian Development Bank

Full analytical report



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Abstract

How can developing economies create the conditions to attain and sustain high-income status while reducing their dependence on commodity cycles? For many of them, industrial upgrading is a central mechanism of sustained growth. Outcomes, however, depend not on expanding output alone, but on combining a developed production base with human capital, technological capabilities and domestic innovation capacity. Drawing on international experience and the approaches of leading institutions, this report proposes a modular, three-stage architecture of industrial development: from a basic production foundation, through an industrial platform, to a knowledge economy and greater technological sophistication. Its operational component comprises screening filters and criteria for selecting sectoral modules, alongside requirements for institutions, quality infrastructure, workforce development and financing at multiple levels. Applying this architecture to the Eurasian region shows how natural resources, accumulated industrial capabilities and regional cooperation can ease constraints of scale and open viable niches in higher-value-added production. The report thus provides a framework for the transition to growth driven by productivity and technological learning.

Keywords: developing countries, Eurasian region, transition to high-income status, architecture of industrial transformation, higher-value-added production, industry, human capital, innovation, technological learning.

JEL: O14, L16, L52, O25, L60, O31.

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CONTENTS

EXECUTIVE SUMMARY	5
INTRODUCTION.....	12
1. HISTORICAL EXPERIENCE OF INDUSTRIALISATION: LESSONS FOR DEVELOPING ECONOMIES	16
Why Historical Experience Matters for Developing Economies in the Twenty-First Century	17
Early Industrialisers: The North Atlantic and the Foundations of Industrial Take-off	18
East Asia: Disciplined Catch-up Industrialisation.....	20
Former Socialist Economies: Mobilisation-Led Industrialisation and the Limits of Central Planning	22
Selective Paths to Late Industrialisation: Small and Medium-Sized Economies as an Important Qualifying Case	23
Partial Successes and Constraints: Latin America, Resource-Based Economies and Mobilisation-Led Models.....	24
The Historical Lesson of Changing Growth Mechanisms: From Industrialisation to Innovation-Driven Industry.....	25
A Synthesis of Lessons for Developing Economies	25
2. CONCEPTUAL FOUNDATIONS OF THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION	29
Classical Structuralism and the Big Push Theory	30
Institutional Conditions for Catch-Up Industrialisation: Lessons from East Asia	32
New Structural Economics, Entrepreneurial Discovery and the Product Space ...	34
New Developmentalism and the Macroeconomic Conditions for Industrial Growth	36
Contemporary Industrial Policy: Innovation, Missions, Digitalisation and the Green Transition	37
The World Bank and the IMF: From Ideological Debate to a Framework for Feasibility.....	38
The Middle-Income Trap: From Capital Accumulation to Technological Infusion and Innovation.....	40
Theoretical Foundations: A Synthesis of Industrial Development Concepts	42

3. THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION IN DEVELOPING ECONOMIES	45
Scope, Objectives and Boundaries of the Architecture	47
Modules, Stages, Branching Paths and Transitions	48
Initial Diagnostics.....	54
Market Scale and External Integration as Systemic Conditions for Industrialisation.....	55
Selecting Priority Industries: A Selection Methodology	59
The Institutional Architecture of Industrial Transformation	64
The Financial Architecture of Industrial Transformation	65
Industrial Policy Instruments by Country Conditions and Stage	66
Risks, Critiques and Safeguards of the Proposed Architecture.....	67
An Architecture for Industrial Growth	68
4. APPLYING THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION TO THE EURASIAN REGION: INDUSTRIAL UPGRADING, COOPERATION AND PROJECT FEASIBILITY.....	70
The Eurasian Region as an Application of the Proposed Architecture	72
The Risk of a Middle-Income Plateau in Eurasia: A Shared Challenge, Different Transitions	72
Diagnosing Initial Conditions across Country Groups in the Region.....	73
Applying the New Priority-Selection Methodology to the Region.....	80
A Phased Roadmap for the Region.....	85
Regional Cooperation and Economies of Scale	90
The Institutional and Financial Configuration for Implementation.....	91
Eurasian Industrialisation: A Realistic Portfolio, Country-level Coordination, Integrated Infrastructure and a Multilayered Financial Architecture	95
CONCLUSION	98
REFERENCES	101
ABBREVIATIONS	106
APPENDIX 1. PRIORITY HEATMAP: SCORING PRIORITY SECTORAL MODULES IN THE EURASIAN REGION.....	107

EXECUTIVE SUMMARY

Industry is once again at the centre of the long-term development agenda.

The global economy is entering a new phase of industrial development, marked by the transition from Industry 4.0 to the emerging Industry 5.0: a model based primarily on cost minimisation and extended global value chains is giving way to a more technology-intensive and resilient configuration in which physical production is integrated with digital systems, artificial intelligence, automation, new materials and environmentally efficient solutions. Geoeconomic turbulence, market fragmentation and the reconfiguration of supply chains are increasing demand for supply reliability, the localisation of critical capabilities and the ability to adopt and scale up new technologies rapidly. Manufacturing is therefore re-emerging as a source not only of output and employment, but also of productivity, technological learning, innovation and strategic resilience: advanced economies are returning to reindustrialisation, while developing economies have an opportunity to build their own industrial base and move into more sophisticated production.

For many developing economies, the central challenge today is not simply to sustain growth, but to change its underlying model.

Many have built basic infrastructure, urbanised, reallocated labour to more productive activities, accumulated capital and adopted imported technologies. As incomes rise, however, the returns to these drivers diminish. Economies need to shift from capacity expansion and resource-based advantages towards productivity growth, technological capabilities and innovation. The scale of the challenge is substantial: 108 economies, home to around 6 billion people, belong to the middle-income group, and only 34 economies have moved from this group to high-income status since 1990. These figures demonstrate the difficulty of attaining and sustaining high-income status, but do not imply that every country is already in a trap.

Economies that must make this transition while remaining commodity-dependent are particularly vulnerable.

According to UNCTAD, 95 of 143 developing economies remained commodity-dependent in 2021–2023: commodities accounted for more than 60% of their merchandise exports; this group included over 80% of the least developed countries. Such a model can generate high incomes in favourable market conditions, but leaves output, public finances, exchange rates and private investment sensitive to price shocks. It also perpetuates the investment cycle's dependence on imported machinery, components, speciality chemicals, pharmaceuticals and other complex goods. Maintaining high growth rates therefore does not, by itself, establish a sustainable engine of growth.

This leads to the central argument of the report, which continues the EDB's series of industrial studies: **to attain and sustain high-income status, a developing economy needs its own industrial capabilities.** This does not mean autarky, rejecting foreign investment or seeking to produce everything domestically. It means the ability to

select technologies, operate them reliably, adapt them to local conditions, improve them, develop suppliers and, over time, design more effective products and processes. Openness remains essential, but its success should be measured by the extent to which equipment imports, foreign direct investment and participation in value chains increase domestic value added, capabilities and production resilience.

Industry connects investment with innovation by making production a continuous learning process. It creates demand for standards, metrology, engineering services, production management, suppliers and skilled jobs. Firms develop the human capital required for technological transition: highly skilled workers, technicians, engineers, process engineers, quality specialists, production managers and applied researchers. These are the people who turn imported equipment from a physical asset into productive knowledge. The sequence is clear: an industrial base builds skills; skills enable technology absorption and adaptation; technological mastery opens the way to domestic innovation.

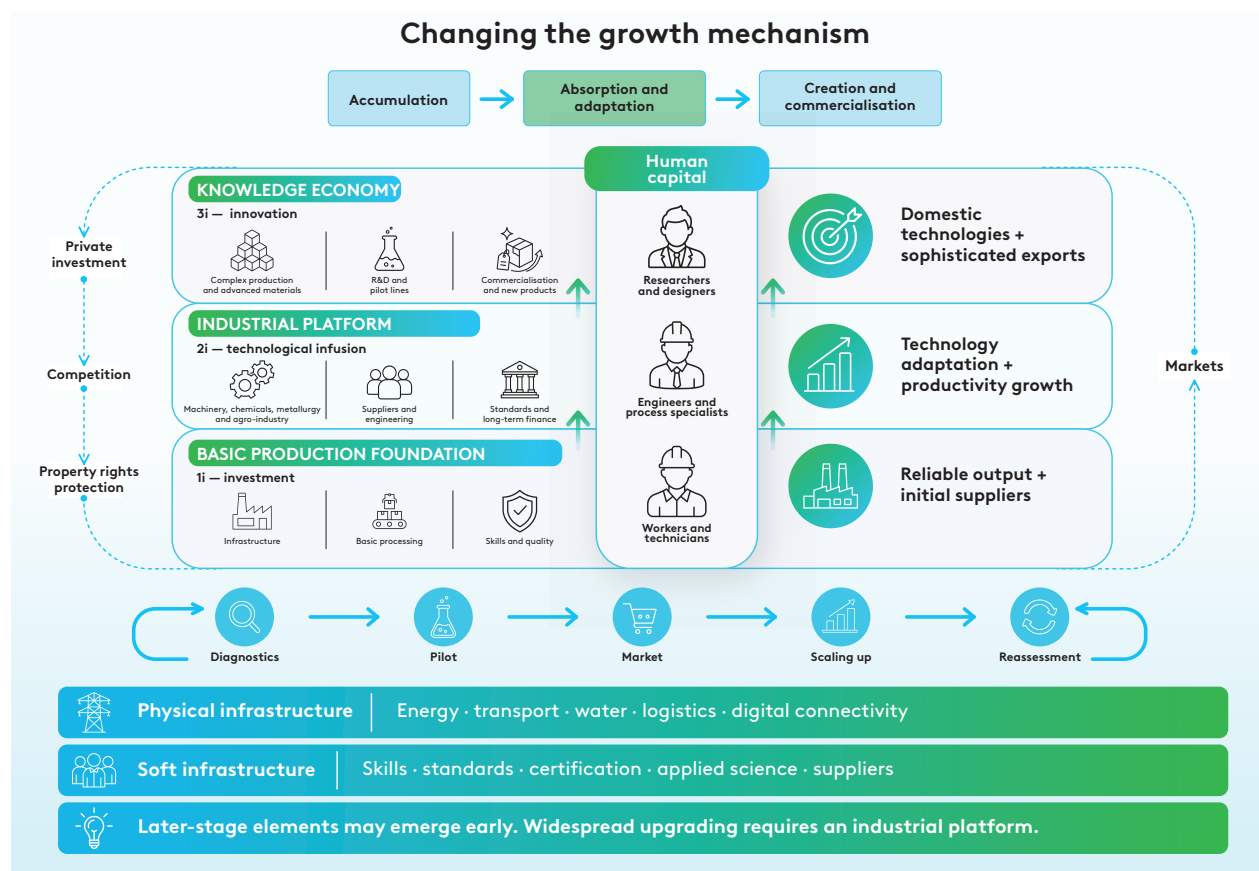
Empirical evidence confirms that this mechanism operates across the economy. UNIDO estimates that manufacturing development was associated with 64% of economic growth episodes over the past 50 years. On average, one manufacturing job supports a further 2.2 jobs in related sectors, expanding demand for transport, logistics, construction, services, education and applied science. Industry accounts for 53% of global R&D, and industrial firms held almost 60% of green patents in 2023. Its significance therefore lies not only in direct output, but also in its ability to build ecosystems, diffuse knowledge and raise productivity in other sectors.

The report translates this argument into a practical architecture of industrial transformation. Its purpose is to show how economies can move from raw materials and low-value-added activities to more sophisticated production without replacing market selection with administrative choices. Private firms invest, compete, bear entrepreneurial risk and validate the viability of new niches. Public institutions provide what individual firms cannot create on their own: shared-access infrastructure, standards, skills, project preparation and risk-sharing mechanisms. Results are assessed not only through capacity commissioning and output, but also through productivity, the adoption of new processes, supplier development, engineering and technical employment, and the commercialisation of research and development.

This framework draws on a common lesson from history: successful industrialisation combined markets with institutions that accelerated learning and removed systemic barriers. Early industrialisers demonstrated the importance of scale, infrastructure and long-term capital; East Asia highlights export discipline, workforce development and technology adoption; former socialist economies show the limits of creating capacity without competition and market feedback. Costa Rica and Viet Nam show that small and medium-sized economies can enter sophisticated niches through openness, investment and human capital. What can be transferred is not a ready-made recipe, but the principle of phased, adaptive and market-compatible policy.

The architecture of industrial transformation organises this logic into a three-stage sequence that echoes the World Bank’s 1i–2i–3i approach: investment, technological infusion and innovation. The first stage establishes the physical and workforce foundations of production. In the second, external technologies spread across firms, are adapted to local conditions and become domestic engineering and organisational capabilities. In the third stage, the economy gains the capacity to create and commercialise its own solutions. The stages overlap, so individual laboratories, digital firms or technology niches may emerge earlier. Widespread upgrading, however, requires an industrial platform, suppliers, standards, skills and long-term financing.

↓ Figure A. The architecture of industrial transformation: from an industrial base to a knowledge economy.



Source: compiled by EDB experts.

The first stage establishes a basic production foundation and operational reliability. It encompasses energy, transport, water, industrial sites, logistics, utility connections, digital connectivity, basic quality infrastructure and technical and vocational skills. These foundations support agro-processing and food processing, basic chemicals and construction materials, primary and secondary processing of raw materials, simple metal and plastic products, repair, maintenance services and economically viable assembly. The principal outcome is not capacity commissioning itself, but firms’ ability to produce consistently to specified quality standards, master equipment, reduce defects and downtime, and establish initial supplier networks.

The second stage connects individual production activities into an industrial platform, while the third turns that platform into a source of knowledge and new products. Technological infusion develops machinery manufacturing, more advanced chemical and metallurgical processing, electrical engineering, pharmaceuticals, sophisticated agro-processing, supplier networks, export certification and project finance. At this stage, external technology becomes a domestic capability. The innovation stage adds applied R&D, intellectual property, pilot production lines and commercialisation. Industrial AI, robotics, biotechnology and new materials do not replace basic and medium-technology industries: they improve their productivity, quality and resilience.

Human capital connects all three stages, and its composition must evolve alongside production. The first stage requires practical skills at scale: skilled workers, supervisors, technicians, maintenance specialists and line managers. The second calls for engineers, process engineers and specialists in quality, digitalisation, procurement and production systems management who can adapt equipment and develop suppliers. In the third stage, researchers, design engineers, technology entrepreneurs and commercialisation managers become increasingly important. Education yields the greatest returns when it addresses firms' real operational needs.

Infrastructure, both physical and soft, plays the same cross-cutting role. Energy, transport, warehouses, industrial sites, water, utility networks, cold chains and digital connectivity determine production costs and reliability. Standards, certification, metrology, vocational and engineering education, applied science, export and investment support, project offices and supplier-development programmes ensure compatibility and confidence in quality. In the first stage, these resources establish basic reliability; in the second, they allow the platform to function as a system; in the third, they provide access to more sophisticated technologies and markets. These are shared productive resources that expand opportunities for many firms.

This logic implies that a major industrial leap is feasible primarily in selected niches and, at the economy-wide level, through accelerated and partly parallel progress through the foundational stages, rather than by skipping them. It requires accumulated resources and capabilities, related production activities and verified demand, together with the synchronisation of infrastructure, skills, standards, technologies and long-term financing. Implementation should begin with pilot projects, scaling up only those solutions that demonstrate productivity, quality and commercial viability. A leap shortens the time needed to turn investment and external technologies into domestic capabilities, but does not eliminate the need for an industrial platform.

To prevent this policy from becoming a collection of sectoral aspirations, **the report proposes a reproducible selection procedure using a priority heatmap.** Activities pass through five preliminary filters: market scale; critical resources and capabilities; technological and product relatedness to established activities; infrastructure readiness; and institutional and financial feasibility. They are then assessed for

market potential, multiplier effects, supply-chain resilience, export competitiveness, cooperation and project feasibility. First-choice instruments are infrastructure, skills, industrial sites, quality and market access. Subsidies, tax incentives and other more costly measures are permissible only with transparent competitive selection, private co-financing, measurable indicators, a limited duration and the withdrawal of support where results are not achieved.

The report's analytical novelty and practical contribution lie in bringing together approaches usually considered separately. Historical lessons, contemporary theories of industrial policy and implementation requirements are integrated into a single sequence: diagnostics, selection, piloting, scaling up, financing and evaluation. Within the contemporary debate, the report adopts a pragmatic synthesis: markets select and validate solutions, while public institutions remove infrastructure, skills, coordination and financing barriers. This approach shows how investment and external technologies become domestic production capabilities, technological mastery and home-grown innovation, with human capital playing a role throughout.

Applying this logic to the Eurasian region shows why both the scale and the quality of industrial growth matter. The region has a large industrial sector, a substantial resource and energy base, an engineering legacy, growing markets and considerable production capabilities. In many countries, however, exports remain concentrated in commodities and low-value-added products, while the investment cycle depends on imports of machinery, equipment, pharmaceuticals, fine chemicals, and electronic and electrical components. The central task is to turn growth and investment into productivity, supplier networks, engineering skills and innovation.

A scenario estimate from the EDB's previous study illustrates the scale of untapped opportunities. Realising the potential of four interconnected industrial complexes — chemicals, machinery manufacturing, high-value-added metallurgy and food processing — could generate over US\$510 billion in additional annual output at 2019 prices. Around US\$71 billion is associated with export growth, US\$81 billion with replacing part of critical imports, and US\$361 billion with indirect and induced effects. For Kazakhstan, the Kyrgyz Republic, Tajikistan and Uzbekistan, the combined estimate approaches US\$57 billion a year, or about 13% of their 2019 output.

The quantitatively assessed core sets the direction but does not exhaust the portfolio of industrial upgrading opportunities. The priority heatmap complements it with electrical equipment and cables, agricultural and irrigation machinery, industrial repair and engineering, packaging, construction materials, pharmaceuticals and medical devices. Over a longer horizon, opportunities may include critical and advanced materials, energy equipment, industrial automation and software, electronics and components, environmentally efficient equipment, bioindustries and nuclear technologies. Such niches become near-term priorities only when demand, capabilities, quality infrastructure, private-sector interest and project feasibility are established, rather than because a technology is fashionable.

Differences between countries call for complementary specialisation. Russia and Belarus can develop the most sophisticated links: equipment, components, standards, engineering, servicing, testing and selected technology niches. Kazakhstan and Uzbekistan can turn their resource, energy and agricultural bases, together with growing demand, into chemical and materials value chains, higher-value-added metallurgy, electrical engineering and equipment for mining, energy, agribusiness and transport. Armenia, the Kyrgyz Republic and Tajikistan can strengthen regional chains through specialised components, services, textiles, agri-food production, packaging, pharmaceuticals and materials-related segments.

A country's income group does not determine its stage of industrial development. A single economy may simultaneously host basic first-stage production, second-stage platform industries and selected third-stage innovation niches. The three-stage sequence should therefore be applied to each country–sectoral module combination. For one module, the priority may be reliable infrastructure and mastering standard technology; for another, supplier development and engineering adaptation; for a third, domestic R&D and commercialisation. This unit of analysis avoids both a uniform policy package for all countries and premature investment in high-technology projects without an adequate production foundation.

Regional cooperation within this architecture is a way to overcome constraints of scale. National markets are too small for many capital-intensive activities, whereas the combined EAEU and Central Asian market of roughly 180–220 million people can provide initial demand. The region already accounts, on average, for around 59% of sales of second-stage processed products. The most promising chains are: polymers–packaging–pharmaceutical chemicals; cable feedstock–electrical equipment–machinery in metallurgy; manufacturing–components–servicing– modernisation in machinery; advanced agricultural raw materials processing– packaging–cold-chain logistics; and: pumps–pipes–irrigation equipment–servicing in the water sector. External markets retain their role in testing technological performance and competitiveness.

For these chains to materialise, sectoral decisions must be linked to an integrated infrastructure framework. The Eurasian Transport Network enables the movement of raw materials, semi-finished goods, components and finished products; modern warehouses and cold chains support food processing, pharmaceuticals, packaging, component manufacturing and exports. Central Asia's water and energy complex generates demand for pumps, pipes, irrigation and energy equipment, electrical equipment, agro-processing and services. Investment in energy and digital systems has the greatest impact when it raises firm productivity, supply reliability and the depth of domestic capabilities.

The next element is a financial architecture capable of supporting projects from preparation through to scaling up. Private capital, commercial banks, bond markets, strategic investors, foreign direct investment, export credit agencies,

public–private partnerships, national development institutions and multilateral banks should complement one another. Public and quasi-public resources should focus on project preparation, shared-access infrastructure, early-stage risk sharing, guarantees, certification, industrial sites and pilot production. Scaling up should rest on commercial viability, co-financing and transparent risk assessment.

Multilateral development banks are particularly important in the transition from strategy to a bankable portfolio. Their comparative advantage lies not only in capital, but also in preparing complex projects, early-stage currency and political risk sharing, providing long-term financing, mobilising private investment and connecting national initiatives into regional chains. In 2008–2025, international financial institutions and multilateral development banks provided US\$71 billion in non-sovereign financing to the region; US\$17 billion, or 24%, went to industry. The EDB contributed US\$6.6 billion, or 38.1% of these institutions’ cumulative industrial portfolio.

The main practical conclusion is that the bottleneck lies in preparing viable projects, rather than in a shortage of sectoral ideas. Resources, investment and external technologies become productive capital only when infrastructure, skills, standards, suppliers, financing and markets are coordinated around them. Success should therefore be measured by higher productivity and domestic value added, supplier development, reduced dependence on critical imports, greater engineering and technical employment, the adoption of new processes and the emergence of products new to firms and markets.

The proposed architecture of industrial transformation is relevant beyond the Eurasian region. For developing countries, it serves as a navigation tool: it helps align ambitions with the initial production, workforce and infrastructure base; identify activities with verified demand, resources and technological relatedness; establish the necessary preconditions and instruments; build a priority portfolio of viable projects; and scale up or discontinue support based on measurable results. The approach thus helps avoid two extremes: premature commitments to technologically attractive but unprepared projects, and the entrenchment of commodity, assembly or low-value-added specialisation through permanent protection and subsidies.

Ultimately, **the proposed framework shows how to create the conditions to attain and sustain high-income status** without autarky or administrative substitution for markets: the industrial base builds human capital; human capital turns imported technology into an acquired capability; technological mastery provides the foundation for innovation. Industrial development complements openness, digitalisation and the environmental transition, connecting them to investment, productivity, quality employment and the commercialisation of knowledge to create an integrated mechanism for sustained growth.

INTRODUCTION

Most developing economies have entered a period in which growth can no longer rely sustainably on commodity exports, simple manufacturing and imports of sophisticated machinery and technologies. Around 6 billion people — approximately 75% of the world's population — now live in middle-income countries. At the end of 2023, 108 economies were classified as middle-income, home to around 6 billion people. Since 1990, only 34 middle-income economies had attained high-income status ([World Bank, 2024](#)). Industrial development has become a matter of growth rates, income resilience, job quality, the accumulation of technological capabilities and retaining a larger share of value added. In this sense, it remains a central mechanism of long-term structural transformation ([Deléchat et al., 2024](#)).

The contemporary literature describes this change in conditions as the risk of a middle-income trap: a prolonged slowdown in catch-up growth after the advantages of cheap labour, simple capital accumulation, urbanisation and straightforward technology imitation have been exhausted, but before productivity, institutions and innovation capacity comparable to those of economies at the technological frontier have emerged. Attaining and sustaining high-income status therefore requires not only more investment, but also a change in its quality and in the mechanism through which it generates returns ([World Bank, 2024](#); [Iacovone et al., 2025](#)).

The central hypothesis of this report is that a developed domestic industrial base is one of the principal vehicles for this transition. Manufacturing concentrates scalable production, workplace learning, intersectoral linkages, standards, engineering capabilities and external tests of competitiveness. It is in industry that imported technology can progressively become a domestic capacity to operate, adapt and design technologies, and subsequently to create new products and processes. Empirical research demonstrates the distinctive capacity of manufacturing industries for productivity convergence, while also warning that this effect does not translate into economy-wide catch-up growth if manufacturing employment and industrial depth remain insufficient ([Rodrik, 2013](#); [Su and Yao, 2017](#)).

Domestic industry does not imply autarky, rejection of FDI or an attempt to produce everything within national borders. It means having the national and regional capacity to retain critical capabilities: selecting and absorbing technologies, developing suppliers, ensuring quality, designing equipment and processes, providing repair and engineering services, conducting applied R&D and commercialising its results. International openness and cooperation can accelerate this process, but only if they increase domestic value added and technological learning.

Three elements are therefore interdependent. Industry creates demand for sophisticated knowledge and a platform for applying it; human capital builds the economy's capacity to absorb external knowledge; and innovation turns this capacity

into sustained productivity growth and new competitive advantages. Without an industrial base, the innovation system risks remaining disconnected from scalable production; without human capital, investment in equipment generates limited returns; without domestic innovation, an economy may remain locked into assembly and low-margin segments for a prolonged period.

The problem is particularly evident in economies with a commodity-export-based development model. According to UNCTAD, 95 of 143 developing economies remained commodity-dependent in 2021–2023, with commodities accounting for more than 60% of their merchandise exports. More than 80% of least developed countries belonged to this group ([UNCTAD, 2025](#)). In these economies, external earnings depend on market conditions for a narrow range of commodities, the investment cycle relies on imported machinery and components, and domestic demand for sophisticated engineering, research and production capabilities lacks sufficient depth. GDP growth, fiscal revenues, exchange rates and the investment cycle are sensitive to external price shocks.

For industrial policy, moving into higher-value-added production means not only increasing value added, but also reducing volatility. A broader industrial base and export basket reduce dependence on any single commodity cycle and make private investment, employment and public revenues more resilient. A narrow industrial structure may coexist with episodes of rapid growth without delivering technological upgrading. For the Eurasian region, the EDB estimates the scenario potential of intermediate and higher-value-added production at more than US\$510 billion in additional annual output at 2019 prices; the methodology and limits of interpretation are explained in Section 4 ([Ahunbaev et al., 2025](#)).

Long-term evidence also points to manufacturing's distinctive capacity to sustain productivity growth. UNIDO estimates that its development was associated with 64% of economic growth episodes over the past 50 years. The importance of these industries extends beyond their direct contribution to output: on average, one industrial job supports 2.2 jobs in other sectors. This mechanism expands entire production ecosystems, including transport, logistics, construction, engineering services, workforce development and applied research ([UNIDO, 2026](#); [Lavopa and Riccio, 2025](#)).

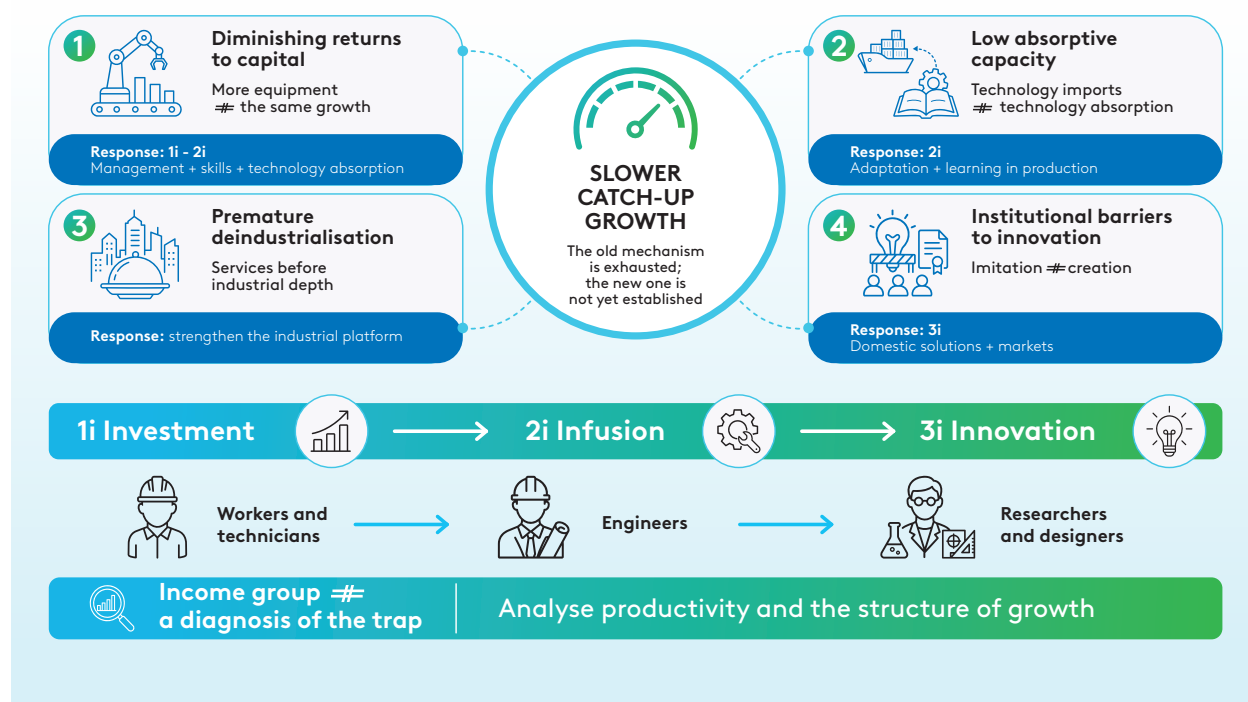
Industry also creates mechanisms for long-term economic upgrading. Manufacturing accounts for 53% of global research and development activity, and industrial firms held almost 60% of green patents in 2023. Industrialisation is therefore a principal channel for accumulating technological capabilities, raising productivity and creating new competitive advantages ([UNIDO, 2026](#); [Donnelly and Lavopa, 2025](#)). Its social and environmental outcomes arise through higher productivity, employment and incomes, stronger intersectoral linkages and the renewal of the production structure.

In the twenty-first century, however, industrialisation is unfolding in a more complex global environment. Competition has intensified, technological barriers have risen,

and requirements for institutions, infrastructure, standards and logistics have become more demanding. Global value chains account for almost half of world trade: they provide access to markets and technologies, but may also entrench developing economies as suppliers of raw materials, energy and low-value-added intermediate goods. The window for classical catch-up industrialisation has therefore narrowed. In Western Europe, the share of industrial employment peaked at an income of approximately US\$14,000 per capita at 1990 prices, whereas in India and several sub-Saharan African countries it peaked at around US\$700. Known as premature deindustrialisation, this phenomenon makes waiting for “natural” industrial deepening a less reliable strategy (World Bank, 2020; Rodrik, 2016).

↓ Figure 1. Why the transition to high-income status becomes more difficult, and the response through the World Bank’s 1i–2i–3i framework (investment–technological infusion–innovation)

FOUR MECHANISMS BEHIND THE MIDDLE-INCOME PLATEAU



Source: World Bank, 2024; Rodrik, 2016; Cohen and Levinthal (1990); Vondenbussche, Aghion, and Meghir (2006).

Developing economies cannot rely solely on commodity exports or replicate the industrial models of the past. They need a flexible architecture that combines deeper processing, the accumulation of production capabilities, medium- and high-technology manufacturing, digitalisation, regional value chains and steady advancement towards more sophisticated positions in global chains. Such a framework must take account of historical lessons, contemporary theories and the practical constraints facing individual countries.

For the Eurasian region, this challenge requires a differentiated formulation. Under the World Bank’s income classification, Armenia, Belarus and Kazakhstan are upper-middle-income economies; the Kyrgyz Republic, Tajikistan and Uzbekistan

are lower-middle-income economies; and the Russian Federation is a high-income economy. This does not mean that the first group is automatically “trapped”, or that the last is guaranteed to be free of the trap. Income classifications capture the current level of GNI per capita, whereas diagnosing a trap requires analysis of the duration of the slowdown, productivity, the structure of growth and distance from the technological frontier. The lack of a common definition also limits the concept’s use as a tool for unambiguous diagnosis of individual economies (Vinokurov et al., 2025d). This report therefore uses a more precise formulation: countries in the region face different versions of a shared task — shifting the engine of growth from accumulation and resource-based advantages to productivity, technological capabilities and innovation.

For the purposes of this report, developing economies are economies not classified by the IMF as *advanced economies* that continue to need industrialisation, export diversification, deeper domestic processing and technological renewal. Where relevant, this group may also include individual emerging-market economies whose structural characteristics and development challenges create similar needs for industrial transformation. This approach recognises that the IMF classification is analytical rather than strictly rules-based. Within the Eurasian region, the group examined comprises Armenia, Belarus, Kazakhstan, the Kyrgyz Republic, Russia, Tajikistan and Uzbekistan.

The report aims to present an architecture of industrial transformation for developing economies that combines historical lessons, leading theoretical approaches and a practical logic for selecting instruments, and then to demonstrate its application to the Eurasian region. A further analytical objective is to show how this architecture enables a developing economy to change its growth mechanism — from one driven primarily by investment and resources, to one driven by industrial productivity, and subsequently by innovation — and what this requires of human capital at each stage.

The structure of the report follows this logic: [Section 1](#) draws lessons from history, [Section 2](#) systematises theoretical approaches, [Section 3](#) presents the architecture of industrial transformation, and [Section 4](#) applies it to the Eurasian region, identifying stages, sectoral modules, forms of cooperation and financing. The appendix sets out the methodology for selecting industries, the criteria framework and country-level reference points.

1.

HISTORICAL EXPERIENCE OF INDUSTRIALISATION: LESSONS FOR DEVELOPING ECONOMIES



Why Historical Experience Matters for Developing Economies in the Twenty-First Century

Historical experience matters not as a collection of ready-made recipes, but as a source of enduring mechanisms of structural transformation: the accumulation of production capabilities, economies of scale, infrastructure, long-term capital, quality institutions, property rights protection, entrepreneurial discovery and the transition to higher-value-added production.

For the purposes of this report, the historical question should be framed more precisely: which countries managed, after their initial industrial take-off, to shift the source of growth from capital accumulation and technology adoption to productivity growth, domestic engineering solutions and innovation, and which institutional and workforce conditions enabled this transition?

History shows that industrial development rarely emerges solely from expanding existing specialisation. In successful cases, market incentives were complemented by conditions that firms could not create independently: transport and energy infrastructure, financial institutions, standards, education, and access to technologies and external markets. Public policy did not replace markets; it reduced infrastructural, informational and coordination barriers to private investment in more sophisticated activities.

Other countries' trajectories cannot be copied literally. Early industrialisers operated with less competition, lower technological barriers and greater freedom in trade policy; East Asia benefited from a combination of geopolitical support, access to large markets, implementation discipline and technological learning. History therefore offers transferable principles, but not universally applicable, context-specific solutions.

This framing is particularly important in today's global economy. As D. Rodrik observes, many developing countries face not simply underdeveloped industry, but premature deindustrialisation, whereby manufacturing's share of output and employment peaks too early and at too low an income level ([Rodrik, 2016](#)). Historical analysis is therefore needed not to romanticise the past, but to develop a realistic architecture of industrial development in a more demanding external environment.

This section identifies lessons for developing economies: the role of market scale, infrastructure and institutions; combining temporary arrangements for new industries with competition and export-market testing; the balance between domestic demand and openness; the limitations of resource-based and centrally planned models; and the need for a phased, modular architecture sensitive to initial conditions.

Early Industrialisers: The North Atlantic and the Foundations of Industrial Take-off

The first industrial powers — the United Kingdom, the United States, Germany and France — demonstrated a development model in which technological advances, entrepreneurial initiative and large-scale production radically increased productivity and national wealth ([Bagchi, 2018](#)). Their experience shows that industrialisation begins not with an abstract “expansion of technology”, but with the combination of several conditions: affordable energy, an expanding market, transport and financial infrastructure, organisational innovation, investment security and institutions capable of sustaining a long investment cycle.

The United Kingdom, which launched the Industrial Revolution in the late eighteenth century, was the first to introduce technological advances into mass production. Textile mechanisation and the development of coal, iron, machinery manufacturing and shipping created an integrated production system, rather than isolated industries. After achieving a sharp rise in productivity and accumulating capital and technological capabilities, the country assumed a leading position in world trade.

The United States, Germany and France followed. Their trajectories differed from Britain’s and do not support the simplistic myth of pure *laissez-faire*. The United States relied on a vast domestic market, railway construction, public procurement and temporary transitional arrangements for selected segments in which a national industrial base was emerging. Germany accelerated industrial upgrading through a combination of bank capital, large enterprises, scientific and technical training, standardisation, infrastructure and demand from major industrial and military purchasers ([Gerschenkron, 1962](#); [Chang, 2002](#)). By 1913, the combined GDP of the industrial countries of the West far exceeded the levels of earlier eras, laying the foundations for their global influence.

Three fundamental conclusions follow. First, market scale is decisive: capital-intensive industry requires sufficient demand to recover investment costs, learn through scale and reduce unit costs. Second, infrastructure is not an external addition to industrialisation; it forms part of industry’s production function by determining the costs of energy, logistics and access to raw materials, suppliers and customers. Third, the financial architecture determines an economy’s ability to move from trade and crafts to capital-intensive production, where investment horizons are longer and project risks higher.

Box 1. Temporary transitional arrangements for new industries and infrastructure development: what can genuinely be transferred from the experience of early industrialisers?

The transferable element in the experience of the United Kingdom, the United States, Germany and France is the understanding that industrial development requires alignment between markets, infrastructure, long-term capital and technological learning. New industries often face high initial costs, a shortage of suppliers, poor quality infrastructure and limited access to finance. Under these conditions, temporary transitional arrangements may be justified if they create opportunities for learning, scaling up and subsequent market validation, without displacing competition.

The external context cannot be transferred. Early industrialisers entered the global economy at a time of much weaker international competition and fewer technological barriers. Today's developing economies operate in a world of mature global value chains, stringent standards, intense competition and more demanding product-quality requirements. Mechanically reproducing historical protectionism cannot therefore be a universal strategy. The more realistic lesson is that any transitional measures must be temporary, transparent, linked to productivity growth and discontinued if they fail to deliver results.

In the second half of the twentieth century, many advanced countries experienced deindustrialisation as a result of offshoring, service-sector growth and automation: manufacturing's share of US GDP fell from around 30% in the 1950s to 10% in the 2010s, exacerbating the difficulties of older industrial regions. Reindustrialisation has begun in recent years. The CHIPS and Science Act and the Inflation Reduction Act support US production of semiconductors, batteries and green energy technologies. Even advanced economies are once again treating industry as a foundation of resilience and innovation, combining private investment, technology programmes, market incentives and public infrastructure.

East Asia: Disciplined Catch-up Industrialisation

While the North Atlantic established the basic logic of industrial capitalism, East Asia provided the most convincing model of catch-up industrialisation within an already established global industrial hierarchy. The most influential post-war trajectories were those of Japan, South Korea, Taiwan, Singapore and, under a different institutional configuration, China.

The core of the East Asian experience comprised macroeconomic stability, human capital, selective incentives, export discipline, technology adoption and market validation. Government support facilitated entry into external markets rather than becoming a permanent privilege ([Johnson, 1982](#); [Amsden, 1989](#); [Wade, 1990](#)): its conditionality, limits and link to performance were decisive.

Japan began modernising during the Meiji Restoration in the late nineteenth century, relying on infrastructure investment, the adoption of Western technologies and initial transitional arrangements to build a national industrial base ([Bagchi, 2018](#)). After the Second World War, Japan accelerated industrial development through land reform, education, technological learning, close cooperation between government and private corporations, and entry into external markets. This created strong export industries in automobiles, electronics and equipment.

South Korea and Taiwan followed Japan's example in the 1960s and 1970s, but with different institutional architectures. South Korea used long-term programmes, targeted financing and export targets to develop shipbuilding, automobiles, electronics, steel and chemicals. Taiwan relied on a more decentralised model: small and medium-sized enterprises, applied technology institutes, export specialisation and a shift from labour-intensive production towards electronics and semiconductors. In both cases, land reform, mass education, firms' capacity to learn and access to external markets were important preconditions.

South Korea is a particularly interesting case. Its heavy and chemical industry programme of the 1970s was long criticised as an excessively costly and risky example of industrial policy. Recent reassessment, however, shows that appropriate timing and disciplined implementation produced lasting effects: in long-run equilibrium, South Korea's economy was approximately 3% larger than it would have been without this industrial push, while the fiscal cost of major subsidies was estimated at around 2.4% of GDP ([Fernandes and Reed, 2026](#)). This estimate is not an argument for indiscriminate large-scale subsidisation, but a reminder that industrial and technology programmes can generate persistent intertemporal gains when embedded in a system of skills accumulation, exports, competition and technological learning.

Box 2. Heavy and chemical industry in the Republic of Korea: transferable and non-transferable lessons

South Korea's development of the heavy and chemical industries rapidly changed its export structure. According to the Korea Development Institute, the heavy and chemical industries accounted for 54% of the Republic of Korea's exports by 1983, exceeding targets only a few years after the main phase of the programme ended (Kim, 1990). Korea's experience shows that these industries can provide a stepping stone to accelerated catch-up development when several conditions are met simultaneously: large investments are combined with technology adoption, support is linked to export performance, financial instruments are aligned with industrial accumulation, and education and organisational discipline enable firms to learn rapidly.

The transferable element is not the administrative replication of sectoral plans, but their underlying logic: temporary incentives, long-term capital, technological learning, export-market testing and regular evaluation. The non-transferable element is the specific configuration of Korea's experience — geopolitical support, the distinctive structure of large business groups, strong administrative discipline and the historical context of the Cold War.

Singapore pursued deep openness, logistical and financial advantages, the attraction of multinational corporations and high administrative efficiency. Its experience shows how a small economy can compensate for a limited domestic market through external openness, world-class infrastructure, predictable regulation, high-quality public services and clear rules for investors.

After 1978, China developed another variant of catch-up industrialisation: special economic zones, large-scale infrastructure construction, foreign investment, integration into global value chains and the gradual accumulation of domestic technological capabilities. Its production base expanded progressively from assembly operations into more sophisticated segments. A study of Chinese industrial firms in 1998–2007 found that a 1 percentage point increase in exports raised total factor productivity by around 0.04 percentage points; this channel explained almost 60% of exporters' productivity growth over the period (Lin, 2015). External markets thus served not only as a source of demand, but also as a mechanism of learning and discipline.

East Asia demonstrated that a late start does not preclude industrial upgrading when selective incentives, export-market testing, human capital, infrastructure, competition and institutional discipline are combined. The success of the "Asian Tigers", however, rested on distinctive conditions — geopolitical support, access to external markets, relatively compact economies and high implementation quality — so other regions need adaptation rather than replication.

The practical lesson is that public institutions can accelerate catch-up development when they reduce entry barriers, provide infrastructure and financing, support learning and require competitive validation of results, rather than substituting for the private sector.

Former Socialist Economies: Mobilisation-Led Industrialisation and the Limits of Central Planning

Industrialisation in the USSR and other socialist countries followed a distinctive path in the twentieth century. The Soviet model relied on central planning and the compulsory mobilisation of resources from agriculture into industry. During Stalin's five-year plans of 1928–1940, the USSR sharply increased the employment share of industry and construction, from 9% in 1913 to 23% in 1940 and almost 40% by the late 1970s ([Bagchi, 2018](#)). Large heavy-industry enterprises — metallurgical complexes, machinery plants and energy facilities — were built, often from scratch and within short periods.

By the 1950s, the USSR and the socialist bloc had substantial industrial capacity, with industry accounting for 40% or more of their economies. This secured military and technological autonomy in several fields, including nuclear technology, space, heavy machinery and defence industries. By 1971, the USSR and the socialist countries of Eastern Europe together accounted for approximately 13% of world GDP ([Maddison, 2001](#)).

By the 1970s and 1980s, however, the model's systemic limitations were becoming apparent: low enterprise efficiency in the absence of competition, weak responsiveness to consumers, technological lag behind leaders in electronics and precision engineering, shortages of consumer goods, weak incentives for entrepreneurship and excessive reliance on extensive growth. Socialist economies eventually entered a crisis and embarked on market reforms in the 1990s, during which the share of the former USSR and socialist Eastern Europe in the world economy more than halved, reaching 5.3% by 1997 ([Maddison, 2001](#)).

The socialist bloc's experience shows that concentrating resources can rapidly create basic capacity, heavy industry and selected technology complexes, but without competition, private initiative, market feedback and incentives to innovate, the system loses its capacity for sustained upgrading.

Another lesson is equally important: during market transformation, it is necessary to preserve and modernise basic infrastructure — energy, transport, water, telecommunications, education and healthcare — as well as the core of industrial capacity, where it can be adapted to a competitive economy. Destroying production chains and capabilities often costs more than modernising them gradually.

The lesson from the former socialist economies concerns institutional balance rather than the superiority of state ownership. Effective public institutions must provide infrastructure, property rights protection, predictable regulation, competition, contractual discipline, macroeconomic stability and external performance benchmarking. Otherwise, industrial policy becomes a source of inefficiency and regulatory risk.

Selective Paths to Late Industrialisation: Small and Medium-Sized Economies as an Important Qualifying Case

The experience of countries without a large domestic market or the capacity for administrative mobilisation is also relevant to today's developing economies. It identifies mechanisms suited to small and medium-sized economies: openness, investor protection, institutional support, human capital, niche specialisation, high-quality public services, access to external markets and carefully calibrated vertical measures.

Costa Rica is a telling example. After the crisis of the early 1980s, the country adopted an export-oriented trajectory in which trade liberalisation, free trade agreements, export promotion and foreign direct investment, particularly in more technology-intensive segments, played key roles. The decisive factor was not openness alone, but its combination with investment in education and healthcare and the creation of specialised trade and investment promotion institutions ([Deléchat et al., 2024](#)). According to WIPO, Costa Rica's medical device exports rose from US\$288 million and 5% of total exports in 2000 to US\$7.6 billion and 42% in 2023; 12 of the world's 30 largest MedTech OEM companies operate in the country, and its production specialisation has expanded from basic assembly to more sophisticated medical technologies and selected R&D functions ([WIPO, 2024](#)). Costa Rica exemplifies a small economy that has moved into a sophisticated export niche.

Viet Nam's experience is equally important: over several decades, it moved from a predominantly agricultural economy to an industrialising export system. Its trajectory rested on macroeconomic stabilisation, gradual trade liberalisation, a legal framework for foreign investment, education reforms and special economic zones. Viet Nam shows how a developing economy can compensate for a limited domestic market through export integration. According to WITS, its merchandise exports reached approximately US\$353 billion in 2023; the country exported 3,761 HS6 product lines to 97 countries, and manufactured goods accounted for around 85% of merchandise exports ([WITS, 2023](#)).

India's experience challenges another misconception: a large domestic market does not by itself accelerate industrialisation unless supported by skills, clusters, competition, the business environment, quality infrastructure and targeted incentives ([Deléchat et al., 2024](#)). Market scale is an important condition, but it must be converted into demand for sophisticated products, investment, suppliers and engineering capabilities.

Small and medium-sized economies are not condemned to commodity or narrowly service-based specialisation, but they need a more carefully calibrated architecture than large countries: access to external markets, investment protection, export and FDI support, high-quality public services, compatible standards and the selection of niches with verified demand and learning potential.

Partial Successes and Constraints: Latin America, Resource-Based Economies and Mobilisation-Led Models

The history of industrialisation also matters for the limitations it reveals. Import-substitution industrialisation in Latin America created basic industries and expanded urban labour markets, but difficulties arose when temporary arrangements became permanent and industries remained in protected domestic markets without export-market testing, technological dynamism, competition or macroeconomic stability ([Deléchat et al., 2024](#)).

This experience is particularly relevant to contemporary industrial policy. It shows that the existence of domestic production does not by itself constitute successful structural transformation. If firms are guaranteed a market without requirements for productivity, quality, technological learning and competitiveness, inefficient structures can become entrenched. Import substitution today should therefore mean reducing dependence on critical imports while preserving incentives for quality, competition, private co-financing and external validation, rather than closing markets.

Resource-based economies face a distinct set of constraints. Natural-resource rents are neither an advantage nor a curse in themselves; they become one or the other depending on how they are used. When commodity revenues are directed mainly towards current consumption, imports and sustaining an overvalued exchange rate, industrial development is impeded. When invested in transport, energy, skills, applied science, quality infrastructure, standards, technological preparation and deeper domestic processing, resource rents can provide the financial foundation for industrial upgrading.

Resource-based economies are particularly exposed to “the Dutch disease”: substantial commodity revenues may sustain an exchange rate that makes sophisticated imports cheap and domestic manufacturing less attractive. Industrial strategies in resource-rich countries must therefore address not only sectoral measures, but also macroeconomic conditions: a competitive real exchange rate, long-term capital, sustainable fiscal rules, infrastructure development and protection of private investment.

Centralised and mobilisation-led models also offer a mixed lesson. They can concentrate resources rapidly, but struggle with continuous technological renewal unless embedded in competition, market feedback, protection of entrepreneurial initiative and performance discipline. For today’s developing economies, industrial

policy should therefore be institutionally disciplined rather than mobilisation-led, with time-limited measures, transparent criteria, regular evaluation and the ability to discontinue ineffective programmes.

The Historical Lesson of Changing Growth Mechanisms: From Industrialisation to Innovation-Driven Industry

Historical examples show that creating an industrial base and attaining high-income status are not the same. The initial phase of successful catch-up development generally relied on investment, infrastructure, mass education, the reallocation of workers to more productive industries and the absorption of external technologies. As wages, capital intensity and technological complexity increased, however, the old model ceased to deliver the same growth rates. Countries needed a second transition: from simple capacity expansion to productivity improvements within industries, more sophisticated products and domestic technological capabilities.

This is where the trajectories of successful and partially successful industrialisers diverge. East Asian economies consistently strengthened not only output, but also firms' capacity to learn: they developed engineering education, applied technology institutes, domestic suppliers, quality control, export discipline and corporate R&D. Equipment and licence imports were accompanied by absorption, adaptation and a gradual transition towards domestic design. By contrast, systems whose industrial base remained dependent on permanent protection, imported components or administrative allocation without competition and technological feedback experienced a slowdown.

The key historical conclusion is that an industrial base supports the attainment and retention of high-income status not merely through production capacity, but through the ability to raise productivity systematically, accumulate capabilities and renew the product structure. As economies become more sophisticated, constraints extend beyond capital and infrastructure to the quality of human capital, firms' managerial capabilities, applied science, competition, commercialisation and institutions for technology diffusion. The World Bank's 1i-2i-3i approach (*investment-technological infusion-innovation*) captures this logic clearly ([World Bank, 2024](#)). Omitting any link in this sequence makes the transition unsustainable.

A Synthesis of Lessons for Developing Economies

The historical evidence yields eight lessons directly relevant to the architecture of industrial transformation.

First, industry remains a key vehicle for long-term productivity growth and technological learning. This does not mean that development strategy should be confined to manufacturing in a narrow sense. Yet it is around industry that the

densest connections emerge among engineering, transport, energy, applied science, standards, logistics, equipment, services and organisational innovation. Successful diversification therefore almost always includes an industrial core, even when some value added is subsequently generated in logistics, engineering services, software, design or after-sales service.

Second, industrialisation proceeds in stages, but is almost never strictly linear. Economies move from simpler to more sophisticated production at different speeds and along different paths. The North Atlantic countries developed through classical heavy industry; East Asia combined labour-intensive exports, technology adoption and a subsequent shift towards capital- and knowledge-intensive sectors; small open economies more often advanced through niche export segments, FDI and institutional intermediation. Today's developing economies therefore need an architecture of modules and transitions rather than a rigid ladder with a uniform sequence of steps. Transitions between modules must be supported by demand, investment feasibility, export-market or other competitive testing, and available infrastructure and skills.

Third, public institutions matter, but outcomes depend on the quality of institutional design rather than the scale of intervention. Early industrialisers, East Asia, resource exporters and centrally planned economies show that industrial upgrading is difficult without infrastructure, standards, access to long-term finance, workforce development and coordination among market participants. The public role becomes productive, however, only when combined with competition, selection, private co-financing, export-market or other external performance testing, and the capacity to discontinue ineffective measures. The question is therefore not whether the state should "lead" the economy, but which public instruments reduce genuine barriers to private investment while remaining compatible with market discipline.

Fourth, market scale has structural significance. Large countries benefit from domestic demand; small and medium-sized economies do not. Export orientation, regional agreements, industrial sites, FDI, cooperative production chains and compatible standards are therefore particularly important for the latter, compensating for limited national markets. This is a key lesson for developing economies generally and for the subsequent application to the Eurasian region. The domestic market can provide initial scale, but external openness is necessary to test efficiency, access technology and expand demand.

Fifth, macroeconomic stability, human capital and institutional capacity are integral to industrialisation, rather than background conditions. Latin America shows the limits of industrial deepening without macroeconomic stability and competition; East Asia demonstrates the opportunities created by combining industrial policy with skills accumulation; and contemporary cases from Costa Rica, Viet Nam and India confirm that education, the business environment, investment institutions and infrastructure can matter as much as sectoral incentives.

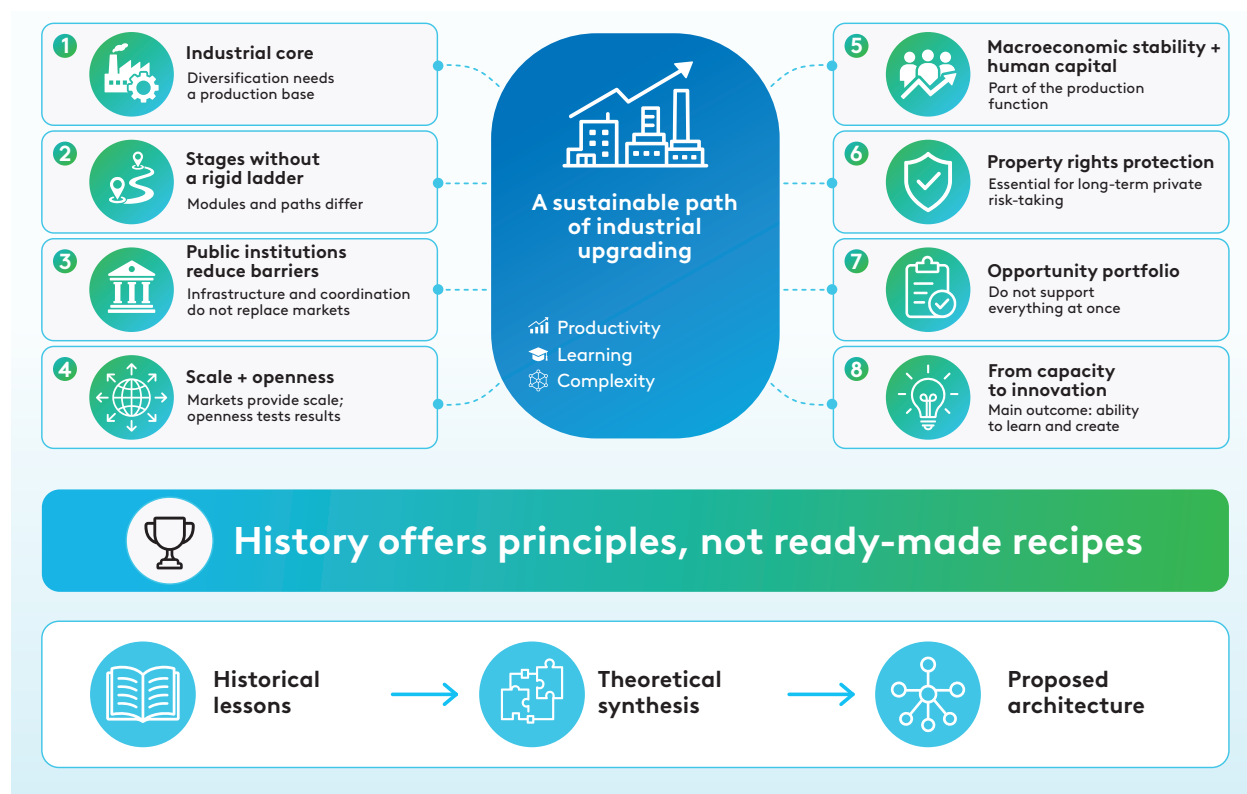
Human capital in this context means more than the general level of education. Its composition matters for industrial transition: widespread technical and vocational skills, engineering and design capabilities, technology and production management, the ability to work with standards and data, research personnel, and entrepreneurs able to commercialise developments. As the economy approaches the technological frontier, advanced human capital becomes relatively more important, whereas at earlier stages the ability of a broad range of firms to absorb existing technologies effectively is especially critical (Vandenbussche, Aghion, and Meghir, 2006; Cirera and Maloney, 2017).

Sixth, property rights protection and predictable rules are essential preconditions for entrepreneurial discovery. Private investors and entrepreneurs enter new production niches only when the returns on investment are protected against arbitrary revision, contractual rights are enforceable, regulation is predictable, and judicial and administrative systems do not turn successful projects into sources of additional risk. Without property protection, clear entry and exit rules, transparent regulation and safeguards against arbitrary appropriation of the gains from private initiative, industrial policy loses its market foundations. Even formally sound sectoral priorities may then fail to generate investment, because entrepreneurs will not bear long-term risks if they expect successful outcomes to be redistributed administratively.

Seventh, sector selection cannot be arbitrary. The history of successful industrialisation supports neither “backing everything at once” nor an immediate leap into the most complex technology niches. Success is more likely when new activities build on existing resources, skills, related industries, logistics, standards and markets, while opening a path to the next level of sophistication. Industrial development must therefore account for both initial advantages and the trajectory of future upgrading. Priorities should form a portfolio of testable industrial opportunities screened for demand, scale, relatedness, financial viability and institutional viability.

Eighth, an industrial base becomes a mechanism for attaining and sustaining high-income status only when it develops into a system of technological learning and innovation. Production capacity alone does not guarantee sustained convergence with advanced economies. If firms remain in assembly operations, depend on imported solutions and fail to build their own engineering, design and managerial capabilities, productivity growth eventually slows. Industrial policy must therefore assess not only the volume of capacity created, but also the speed of new-process absorption, quality improvement, supplier development, workforce skills growth, applied R&D and the emergence of new products.

↓ Figure 2. Transferable lessons from the history of industrialisation: eight principles for developing economies



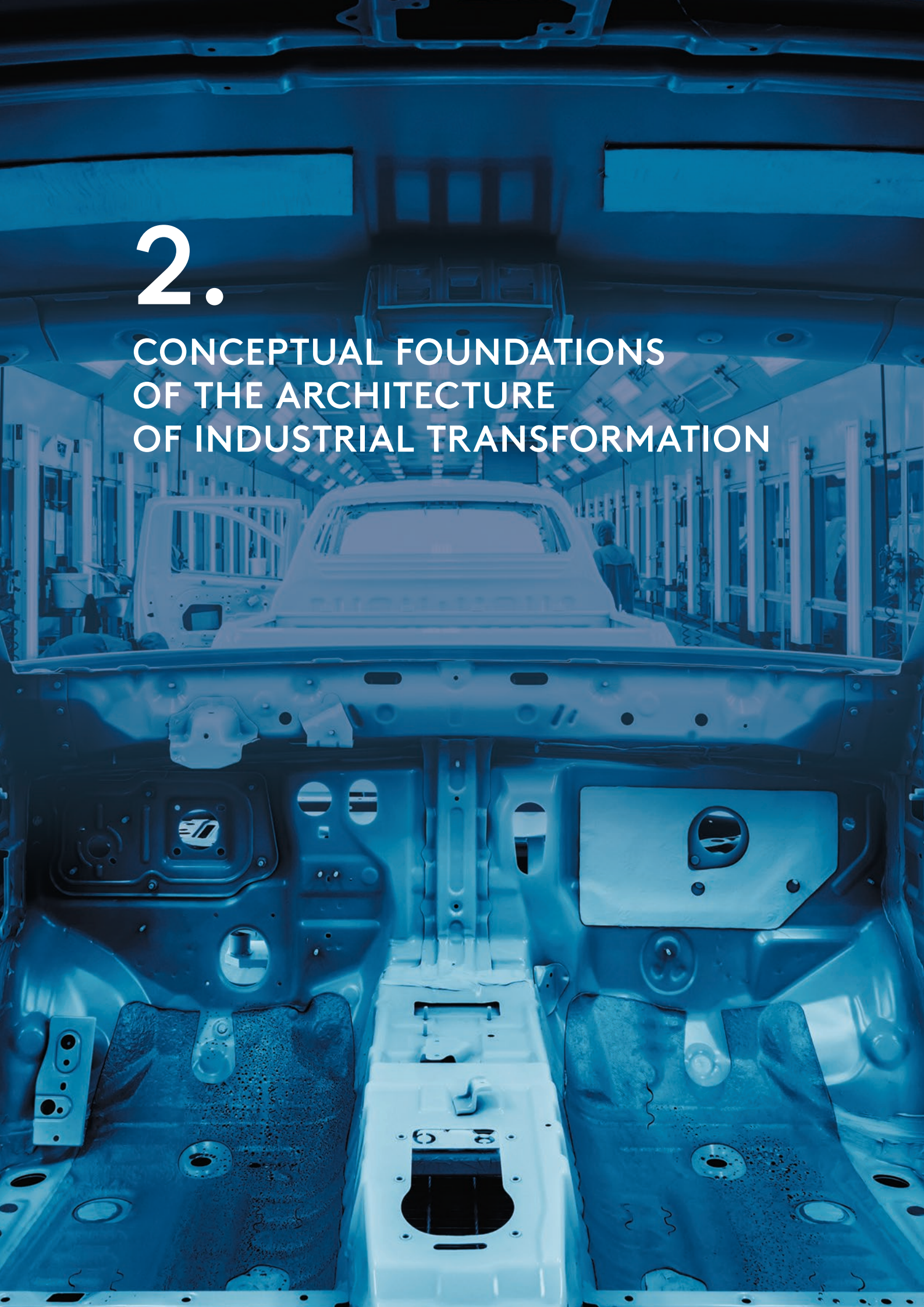
Source: compiled by EDB experts based on Section 1 of the report.

This lesson directly connects industrial policy with human capital policy. Investment in education has the greatest impact when embedded in real production tasks, while firms earn the highest returns from technology when they can draw on skilled workers, engineers and researchers. Domestic innovation and domestic human capital are therefore not parallel social objectives, but internal conditions for industrial competitiveness and sustained growth.

These lessons provide the historical foundation for the remainder of the report. Section 2 relates them to the principal theories of industrial development, and Section 3 integrates them into an architecture of industrial transformation for developing economies. History plays a constructive role: it places limits on naive replication, while identifying mechanisms that, in different combinations, continue to determine success or failure in catch-up development. Their essence is not state paternalism, but the creation of conditions in which private investment, competition, infrastructure, institutions and technological learning combine into a sustainable trajectory of industrial upgrading.

2.

CONCEPTUAL FOUNDATIONS OF THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION



This section identifies the theoretical approaches needed for an architecture of industrial transformation. The debate is not reducible to “markets” versus “the state”; the key question is which market, institutional, infrastructure and financial conditions enable private firms to enter higher-value-added production, accumulate capabilities, compete and expand domestic value added.

In the transition to high-income status, these theories address different parts of a shared challenge. Structuralism explains the need to change the composition of production; theories of late industrialisation explain the role of coordination and long-term capital; “new structural economics” identifies feasible paths of capability acquisition; self-discovery theory establishes the need for entrepreneurial experimentation; and the innovation literature explains the transition from adopting to creating knowledge. Their synthesis must explain not only the launch of industrial growth, but also the shift in its drivers, as an economy approaches the technological frontier.

Industrial development is understood as structural transformation, rather than the administrative designation of industries: markets select and validate solutions, while public institutions reduce barriers that firms cannot remove independently. These include inadequate infrastructure and engineering skills, poor quality infrastructure, limited long-term capital, information and coordination failures, and regulatory uncertainty.

The proposed architecture combines four principles: changing the composition of production, not simply increasing output; testing new activities against demand and competition; ensuring that public incentives are temporary, transparent, competitive and measurable; and protecting property, regulatory predictability and contractual rights, as the foundations of entrepreneurial discovery.

Classical Structuralism and the Big Push Theory

Classical structuralism laid the foundations for understanding industrialisation in terms of an economy’s position in the international division of labour and its internal production structure. Raúl Prebisch and Hans Singer challenged the view that specialising in commodities and simple goods automatically enables developing countries to converge with the industrial core. The Prebisch–Singer hypothesis argued that long-term movements in the terms of trade can disadvantage economies on the periphery of the industrial centres: commodity prices rise more slowly than manufactured-goods prices, and commodity specialisation entrenches structural asymmetry in the global economy ([Prebisch, 1950](#); [Singer, 1950](#)).

The structuralist conclusion was that a developing economy cannot merely expand its existing export profile. It needs to change its production structure, deepen domestic processing, build industrial capabilities and reduce dependence on imported finished goods where that dependence becomes critical for investment, employment and technological development. In Latin America, these ideas underpinned

import-substitution industrialisation, which did create basic industries in several countries, expand urban labour markets and establish foundations for metallurgy, chemicals, automobiles and consumer-goods manufacturing.

Historical experience also revealed the limitations of a closed model. When temporary transitional arrangements become permanent protection and firms face no competition or requirements for productivity, quality and technological learning, industrial development starts to entrench inefficiency. A contemporary architecture should therefore draw from classical structuralism neither a dogma of closed markets nor permanent domestic protection, but three more durable principles: the need for structural transformation, attention to intersectoral linkages, and recognition of coordination failures that markets cannot always overcome without additional institutions and infrastructure.

Paul Rosenstein-Rodan's Big Push theory made a crucial contribution to this logic. It argued that industry often fails to emerge in developing economies not because individual projects are inherently unprofitable, but because their commercial feasibility depends on other projects emerging simultaneously. A factory may not be built because effective demand is absent; demand fails to emerge because employment and incomes are lacking; suppliers do not enter because there are no large buyers; and buyers do not invest because there are no suppliers. This is a classic coordination failure ([Rosenstein-Rodan, 1943](#)).

A contemporary interpretation of the Big Push does not require a mobilisation economy or central planning. Rather, launching industrial chains requires shared productive resources: energy, transport, logistics, water, industrial sites, standards, certification, metrology, workforce development and project preparation. Individual firms often cannot create these conditions, yet without them, private investment does not move into more complex activities. The practical task of public institutions is therefore to reduce entry barriers and transaction costs for a multitude of private initiatives, rather than to replace entrepreneurs.

Albert Hirschman provides another foundation for the proposed architecture. In his account, industrialisation develops through forward and backward intersectoral linkages. Some industries create demand for raw materials, inputs, equipment, transport, services, semi-finished goods and skilled labour, thereby stimulating other industries. This is particularly important for developing countries, where scarce capital requires a focus on activities with strong multiplier effects ([Hirschman, 1958](#)). The selection of industrial activities must therefore consider not only direct sectoral profitability, but also their ability to generate demand for suppliers, services, engineering capabilities and related production.

The structuralist approach is complemented by the work of W. Arthur Lewis, Alexander Gerschenkron and Nicholas Kaldor. Lewis's dual-economy model explained industrialisation as the transfer of labour from a low-productivity traditional sector

to a more productive modern sector. Gerschenkron showed that late industrialisation requires more developed financial and coordination institutions than early industrialisation, because catch-up economies face a higher technological entry threshold. Kaldor's "growth laws" argued that manufacturing has historically been a principal vehicle for economy-wide productivity growth through economies of scale, learning by doing and technological diffusion (Lewis, 1954; Gerschenkron, 1962; Kaldor, 1967).

Together, these approaches form the first conceptual pillar of the architecture of industrial transformation: industrial development is not structurally neutral. Developing economies do not need merely to expand aggregate output or exports, but to change the composition of production, deepen processing, strengthen domestic linkages and reduce coordination barriers. The history of import substitution also provides a warning: reducing dependence on critical imports must be combined with competition, efficiency, private co-financing, export-market or other market validation, and time-limited measures.

Institutional Conditions for Catch-Up Industrialisation: Lessons from East Asia

Structuralism explained the need to change economic structure, while the literature on East Asia identified the institutional conditions for effective transformation. Chalmers Johnson, Alice Amsden, Robert Wade, Peter Evans and Ha-Joon Chang showed that success depends on institutional quality, links with business, export discipline and performance-based incentives, rather than the scale of intervention (Johnson, 1982; Amsden, 1989; Wade, 1990; Evans, 1995; Chang, 2002).

The concept of the *developmental state* matters primarily for its institutional logic. In Japan, South Korea and Taiwan, public institutions reduced investment, infrastructure and technological barriers, while testing outcomes through exports, productivity, quality and learning. Success rested on conditional, temporary and measurable support and a willingness to discontinue ineffective measures.

The East Asian tradition is broader than "the state picking winners": it created an environment for accelerated learning without exempting firms from market discipline. External markets forced firms to compete on price, quality, delivery times, standards and productivity, so incentives were embedded in performance testing rather than permanent protection.

Peter Evans's concept of *embedded autonomy* combines public institutions' autonomy from the influence of special interests with continuous dialogue with firms, investors, exporters and industry associations (Evans, 1995). It implies organised information exchange with transparency, competition and accountability, rather than a fusion of government and business.

Ha-Joon Chang showed that most advanced economies historically used a wide range of instruments during their own industrial take-off — temporary protection, public procurement, long-term financing, standards, infrastructure and technological learning — before becoming advocates of a more liberal global trade regime (Chang, 2002). In his view, the strict free-trade principles they promote today amount to “kicking away the ladder”: developing countries are denied the very mechanisms that historically enabled the leaders to reach the top of global value chains.

Chang’s argument centres on the distinction between static and dynamic comparative advantage. Relying exclusively on current endowments, such as *cheap labour or raw materials*, maximises short-term efficiency but can entrench technological backwardness and does not guarantee sustained growth. To advance, an economy needs structural transformation: capabilities in more sophisticated sectors, even if those sectors initially lack obvious market competitiveness. Chang illustrates this with South Korea and Taiwan in the 1960s and 1970s. Their entry into capital- and knowledge-intensive industries — *metallurgy, shipbuilding and electronics* — occurred amid shortages of technology and investment resources. Institutional coordination nevertheless overcame initial constraints and, by the 1980s, created new high-technology advantages that displaced simple goods in the export basket.

On this basis, Chang concludes that catch-up development requires a forward-looking strategy. Developing economies should focus on building technological sophistication over the long term, retaining industrial ambitions even when the current structure of global markets encourages them to remain in narrow niches as basic suppliers.

The East Asian literature therefore offers several lessons for today’s developing economies.

First, industrial policy needs a coordination mechanism that can close gaps between infrastructure, skills, financing, standards and business needs, rather than an administrative command centre for the economy. Such a mechanism should help projects become feasible without replacing market selection.

Second, transparent interaction is needed among business, the research and education community, financial institutions and the public sector. Dialogue should identify actual constraints — shortages of suppliers, standards, testing capacity, skills, logistics, market access or long-term capital — rather than allocating privileges.

Third, all public incentives must be conditional. Subsidies, concessional finance, procurement, tax incentives and regulatory arrangements, where used, should be allocated competitively, limited in duration and accompanied by reciprocal commitments on investment, productivity, quality, exports, private co-financing or technological learning.

Fourth, institutions need memory and the capacity to learn. Industrial development requires a horizon longer than the political cycle, but this does not mean that measures should remain unchanged. Institutions must accumulate data, evaluate results, adjust instruments and discontinue programmes that generate rents without productivity growth.

Fifth, active industrial policy must remain compatible with competition, external openness and global benchmarking. East Asian cases succeeded because they linked learning to tests of competitiveness, rather than insulating business from markets.

East Asian experience cannot be transferred mechanically to countries with weak administrative capacity, limited markets, macroeconomic instability, weak property rights protection and no export discipline. The proposed architecture draws on institutional competence, dialogue with business, transparent incentives, competition, performance discipline and learning capacity, rather than the image of a directive state.

New Structural Economics, Entrepreneurial Discovery and the Product Space

New structural economics, articulated most fully by Justin Yifu Lin, combines structuralist ideas with a neoclassical approach: development rests on comparative advantage, but requires the removal of infrastructure and coordination constraints ([Lin, 2012](#)).

For Lin, the optimal economic structure depends on the stage of development and the mix of labour, capital, resources, skills, infrastructure and entrepreneurial capabilities. Industrial policy should therefore help the private sector move into related activities offering higher productivity and technological sophistication, rather than merely listing desirable industries.

Markets retain their role in allocating resources and testing efficiency, but high barriers and inadequate information, infrastructure and coordination lead to underinvestment in new activities. Public institutions should provide shared productive resources — energy, transport, connectivity, sites, standards, education, and research and testing infrastructure — that make private investment possible and less risky.

Lin's practical recommendation is to identify development opportunities by comparison with economies at somewhat higher income levels and with similar factor endowments. Where competitive industries have emerged in such countries and the economy under consideration has similar resources, skills and infrastructure preconditions, these industries may offer a realistic area for industrial transition. Market validation remains essential: even a structurally related industry must be assessed against demand, costs, access to technology, logistics, standards, financing and firms' ability to compete.

Ricardo Hausmann and Dani Rodrik's theory of self-discovery complements the logic of comparative advantage. Pioneering entrepreneurs bear the costs of discovering competitive activities, while other firms can replicate their success without paying for the experiment. The economy therefore systematically underinvests in the search for new production niches ([Hausmann and Rodrik, 2003](#)).

This does not imply that public institutions should designate future industries administratively. The more precise implication is to reduce the costs of entrepreneurial experimentation. Instruments may include project preparation, access to industrial sites, certification, export-entry support, pilot co-financing, supplier development or guarantees where demand and private co-financing are established. Entrepreneurial risk must nevertheless remain with business, and public instruments should reduce systemic barriers rather than replacing market responsibility.

This logic was developed further in research on product space and economic complexity. Countries usually diversify towards products related to established activities in terms of the capabilities required: technologies, skills, standards, organisational forms, suppliers, logistics and institutional requirements. Industrial development is therefore path-dependent: moving into goods that "neighbour" the country's existing production and export profile is easier ([Hidalgo et al., 2007](#); [Hidalgo and Hausmann, 2009](#)).

This has fundamental practical implications. The product-space approach shifts sector selection away from arbitrary choices of "fashionable" industries towards technological attainability, product relatedness and market feasibility. It distinguishes near- and medium-term industrial opportunities from long-term technology options. For a resource-based economy, for example, moving from raw materials into materials, chemicals, components, equipment and services may be more realistic than immediately committing to entirely new high-technology industries without an industrial platform.

Combining new structural economics, self-discovery theory and the product-space approach yields three direct conclusions. First, sector selection must consider not only the desired future state of the economy, but also the path towards it. Ambition without relatedness and feasibility creates a risk of resource misallocation. Second, promising activities should be sought at the intersection of existing production capabilities, verified market demand and technological upgrading potential. Third, industrial policy should operate as a portfolio of testable opportunities, with pilot projects, regular reassessment, the scaling up of successful solutions and the discontinuation of activities that fail to demonstrate commercial and technological viability.

The overall conclusion is that industrial development can be neither a list of universally "best industries" nor passive adherence to existing commodity specialisation. It should be organised as a phased transition along related production paths, with public institutions reducing the costs of discovery, coordination and capability acquisition, and markets validating results.

New Developmentalism and the Macroeconomic Conditions for Industrial Growth

Classical and institutional theories of industrial development are incomplete without macroeconomic conditions. This is the central argument of new developmentalism, associated primarily with Luiz Carlos Bresser-Pereira ([Bresser-Pereira, 2010](#)). Its key proposition is that industrial development is sensitive not only to sectoral incentives and institutions, but also to the system of macroeconomic prices and conditions: the real exchange rate, the cost of capital, inflation, external imbalances and fiscal sustainability.

New developmentalism places particular emphasis on exchange-rate overvaluation, which systematically undermines the competitiveness of tradable sectors, especially manufacturing. This is directly relevant to resource-based and partly commodity-based economies. High commodity-export revenues may sustain an exchange rate that makes sophisticated imports cheap and domestic higher-value-added production less attractive. An economy may consequently display external stability during favourable commodity cycles, while losing incentives to build an industrial core and technological depth.

Recent IMF research on diversification identifies a similar problem: a sustained transition towards more sophisticated exports and production requires a combination of macroeconomic stability, investment in human capital, a long-term horizon, access to finance and a focus on high-productivity tradable sectors, rather than a single “correct” sectoral measure ([Cherif and Hasanov, 2019](#); [Deléchat et al., 2024](#)).

This is particularly important for developing economies for three reasons. *First*, industrial development is difficult to reconcile with chronic macroeconomic instability. High inflation, sharp currency cycles, costly short-term credit, unpredictable fiscal rules and recurrent external crises undermine investment horizons. Developing sophisticated production requires time, equipment, learning, certification and market entry; in an unstable macroeconomic environment, private investors avoid such risks. *Second*, industrial development requires long-term capital. This may come from bank lending, development banks, bond markets, project finance, guarantees, IFIs, funds, PPPs or private capital. What matters is not the source itself, but its maturity, cost, risk allocation and connection to project commercial feasibility. *Third*, industrial strategy in resource-rich countries inevitably involves the use of rents. If commodity revenues mainly finance current consumption, imports and an overvalued exchange rate, industrial upgrading is impeded. If converted into infrastructure, education, standards, engineering capabilities, applied science, logistics and deeper domestic processing, rents can underpin a more sophisticated production structure.

New developmentalism should not be interpreted as a call for continual devaluation, strong protectionism or macroeconomic experimentation. Its contribution is methodological: it shows that industrial strategy must be compatible with the

macroeconomic regime. Developing economies need a configuration of interest rates, exchange rates, fiscal policy and external balance that does not suppress tradable production and allows the private sector to accumulate long-term industrial investment.

Contemporary Industrial Policy: Innovation, Missions, Digitalisation and the Green Transition

Contemporary industrial policy theory has extended the discussion far beyond tariffs and subsidies. Dani Rodrik defines industrial policy as an organised process of identifying and removing constraints on the emergence of new activities. The emphasis shifts from protecting an industry as such to resolving specific coordination, learning and information failures. Contemporary industrial policy is therefore experimental: it requires continuous feedback among business, investors, financial institutions, the research and education community, and the public sector ([Rodrik, 2008](#); [Juhász, Lane, and Rodrik, 2023](#)).

This framing is especially important in reducing paternalistic interpretations of industrial policy. Defining the problem as “supporting an industry” risks creating permanent rents. Defining it as “removing a specific constraint” makes evaluation possible: was the barrier removed, did investment increase, did productivity improve, did exports emerge, did costs fall, and did suppliers develop? Contemporary industrial policy should therefore be problem-oriented rather than benefit-oriented.

Mariana Mazzucato made a significant contribution through the concept of the entrepreneurial state and, subsequently, mission-oriented policy ([Mazzucato, 2013](#); [Mazzucato, 2018](#)). Her central argument is that the public sector can not only correct market failures, but also reduce early-stage technological risks in areas of public importance, finance enabling research, define long-term missions and organise demand for new solutions. This idea has two implications for developing economies.

On the one hand, a mission-oriented approach treats industrial policy as a way not only to catch up, but also to create new niches in pharmaceuticals, advanced materials, clean energy, resource efficiency, medical technologies, industrial automation and digital solutions. On the other, it requires particular caution. A mission must not become a costly declaration unsupported by a production base. In most developing economies, mission-oriented and innovation programmes should rest either on an established industrial platform or on narrowly defined pilot segments with clear commercial and technological validation.

Digital transformation has become an important component of contemporary industrial policy. Industry 4.0, automation, platform technologies, digital twins, artificial intelligence, the industrial Internet of Things and data-driven manufacturing are changing production costs, workforce requirements and the relationship between

manufacturing and services. Developing economies must avoid a new misconception: the digital sector does not replace the industrial base; it improves its productivity, quality and manageability.

An economy without a production core may create individual digital services, but finds it much harder to retain engineering capabilities and generate demand for sophisticated equipment, standards, testing capacity and applied research. Digitalisation should therefore be treated as a horizontal enabler of industry. At early stages, this means basic automation, digital record-keeping, quality control and supply traceability. At the industrial-platform stage, it means ERP/MES systems, the industrial Internet of Things, data-driven quality and supply management, and predictive maintenance. At a more mature stage, it means industrial AI, digital twins, robotics and integrated production-data management.

A further shift is the environmental, or green, turn in industrial policy. Contemporary markets are increasingly sensitive to carbon footprints, energy efficiency, resource conservation, advanced materials, energy storage, clean chemistry and circular processes. Developing economies need not mechanically import every external environmental agenda. Nevertheless, environmental performance is becoming part of global competitiveness. Where energy efficiency reduces costs, standards open markets and resource conservation improves production resilience, green solutions become part of industrial modernisation rather than an external burden ([Rodrik, 2014](#); [Schot and Steinmueller, 2018](#)).

Contemporary industrial policy is therefore also linked to technological resilience. Advanced materials, biotechnology, pharmaceuticals, energy equipment manufacturing, energy storage, digital process control and resource efficiency can become modules for the next stage of development. Sequencing is critical for developing economies: innovation- and mission-oriented instruments should strengthen the overall architecture of industrial accumulation rather than replace it with a technology showcase.

The World Bank and the IMF: From Ideological Debate to a Framework for Feasibility

Recent World Bank and IMF research is particularly important, because it shifts the industrial policy debate from ideological preferences towards feasibility, instrument design and institutional quality. The World Bank's Industrial Policy for Development ([Fernandes and Reed, 2026](#)) argues that industrial policy is considerably more replicable today than was thought in the 1990s, but success depends on selecting appropriate instruments and matching them to country characteristics. Its framework centres on three parameters: *government bandwidth*, domestic market size and fiscal space.

This shift is fundamental. *First*, the World Bank effectively recognises that industrial policy is already ubiquitous: a review of 183 national development plans shows that every country targets at least one industry, and developing economies do so more broadly on average than advanced economies. *Second*, the Bank argues that the main problem in many developing countries is not the use of industrial policy itself, but the wrong choice of instruments: heavy-handed and costly measures, such as broad tariffs and subsidies, are too often used where targeted *public inputs* — industrial parks, skills programmes, market-access support and quality infrastructure — would be more effective (Fernandes and Reed, 2026).

Particularly important is the World Bank's typology of 15 industrial policy instruments in three groups: specialised public inputs that address production bottlenecks; market incentives that influence private-sector behaviour; and macroeconomic intervention instruments that shape the overall development environment. The World Bank distinguishes first-choice instruments, which address a market failure directly, from second-line instruments, which act indirectly and require greater caution.

The World Bank's classification matters when choosing support measures: first-choice instruments directly target *the cause of a market failure*, whereas second-line instruments can create collateral distortions and therefore require greater caution. The former include industrial parks, skills development, market and export support, quality infrastructure and, under certain conditions, production and innovation subsidies. The latter include tariffs, quotas, export subsidies, localisation and local-content requirements, technology-for-market-access arrangements, demand subsidies, foreign-exchange interventions and several other measures. Not all instruments are equally appropriate for all countries: the smaller the market, the weaker the government bandwidth and the narrower the fiscal space — the more limited the permissible toolkit should be and the greater the importance of targeted, relatively inexpensive and institutionally feasible measures (Fernandes and Reed, 2026).

A particularly valuable element is the concept of government bandwidth, originating in earlier work by Ricardo Hausmann and used by the World Bank as an operational constraint. It concerns not the overall size of government, but its ability to engage substantively with many firms, diagnose sectoral constraints, adjust support and track results. The relevant question is therefore not “can the state intervene?”, but “which instruments match the state's actual administrative capacity?” Similarly, market size should encompass more than domestic demand: for most instruments, apart from some trade-protection measures, the size of markets to which a country has durable preferential access also matters. This is relevant to the subsequent analysis of regional cooperation.

The IMF's approach is evolving similarly. “Economic Diversification in Developing Countries” (Deléchat et al., 2024) defines diversification as a shift from dependence on traditional sectors — primarily agriculture, mining and other primary activities — to a broader range of higher-quality industries and services, including through

industrialisation. Diversification is recognised as critical for developing economies. Success, however, requires sustained commitment and strong horizontal foundations. Macroeconomic stability, infrastructure quality, workforce skills, credit access, the regulatory environment and competition are treated as foundations without which vertical measures rarely produce durable results.

An important IMF conclusion is that vertical measures can play a useful but supporting role. They are justified when they address specific market failures, when sufficient government bandwidth exists and fiscal cost-effectiveness is assessed. The IMF therefore stresses caution regarding special economic zones, tax incentives and other narrowly targeted benefits. Evidence from Costa Rica, Gabon, Georgia, India, Senegal and Viet Nam links sustained outcomes primarily to macroeconomic stability, human capital investment, competition, infrastructure improvements and better governance ([Deléchat et al., 2024](#)). For the proposed architecture, horizontal conditions are thus not a “background” to industrial policy; they are its operational foundation.

Contemporary World Bank and IMF frameworks yield six conceptual conclusions. *First*, industrial policy can be a justified development instrument when it targets specific market, infrastructure or coordination failures. *Second*, instruments should match government bandwidth, market size and fiscal space rather than be copied from successful foreign cases. *Third*, vertical measures cannot replace basic horizontal conditions: macroeconomic stability, infrastructure, skills, competition, property rights protection and governance quality. *Fourth*, vertical instruments require transparency, KPIs, sunset clauses, assessment of fiscal cost-effectiveness and feedback mechanisms. *Fifth*, small and medium-sized developing economies should prioritise instruments that address coordination and information failures without excessive fiscal burdens. *Sixth*, market scale extends beyond national demand: regional cooperation and external openness may be necessary for industrial projects to be commercially viable.

The contemporary World Bank and IMF frameworks therefore bring rigour to the case for an architecture of industrial transformation. They embed three principles: conditional instruments, alignment with initial constraints and a clear distinction between what is desirable and what is feasible.

The Middle-Income Trap: From Capital Accumulation to Technological Infusion and Innovation

The middle-income trap concept clarifies industrial policy’s dynamic challenge. At low income levels, growth can be sustained primarily by investment, infrastructure, urbanisation and the transfer of workers into more productive activities. At middle-income levels, this is no longer sufficient: as wages rise and readily available gains are exhausted, productivity must increase through better resource allocation, technology absorption and more efficient firms. At the upper end of the middle-income range, another regime shift is required — from technological infusion to domestic innovation ([World Bank, 2024](#)).

This sequence can be incorporated into the architecture as 1i–2i–3i: *investment, technological infusion and innovation*. Investment creates the physical foundations of production. Technological infusion means not passive equipment imports, but technology diffusion and adaptation through firms, suppliers, standards, specialist mobility, FDI, licensing and international cooperation. Innovation means the ability to create and commercialise products, processes and business models new to the market, while continually renewing existing production.

Industry occupies a distinctive position in this sequence. Manufacturing offers scalability, dense forward and backward linkages, learning-by-doing opportunities and external tests of competitiveness. Research identifies sustained productivity convergence within manufacturing. At the economy-wide level, however, convergence remains weak if industry's share is small and resources are not reallocated sufficiently towards efficient firms (Rodrik, 2013). In middle-income countries, industry drives other activities by stimulating high-productivity services, infrastructure, logistics, digitalisation and applied research (Su and Yao, 2017).

An industrial base does not automatically guarantee escape from the trap. An “assembly trap” is possible, in which a country increases output while remaining dependent on imported design, equipment, key components and technological solutions. Domestic value added and learning then remain limited, and growth is vulnerable to rising wages and changes in external chains. Success must therefore be assessed not only by industry's share, but also by the depth of domestic capabilities, productivity, supplier development and the ability to modernise processes and create new products.

Human capital is the connecting condition. The concept of absorptive capacity shows that external knowledge yields returns only when prior knowledge and organisational capabilities enable it to be recognised, assimilated and applied (Cohen and Levinthal, 1990). As an economy approaches the technological frontier, advanced human capital and research capabilities become more important (Vandenbussche, Aghion, and Meghir, 2006). Education, vocational training, applied technology institutes and corporate learning are therefore part of production strategy, rather than an external social policy.

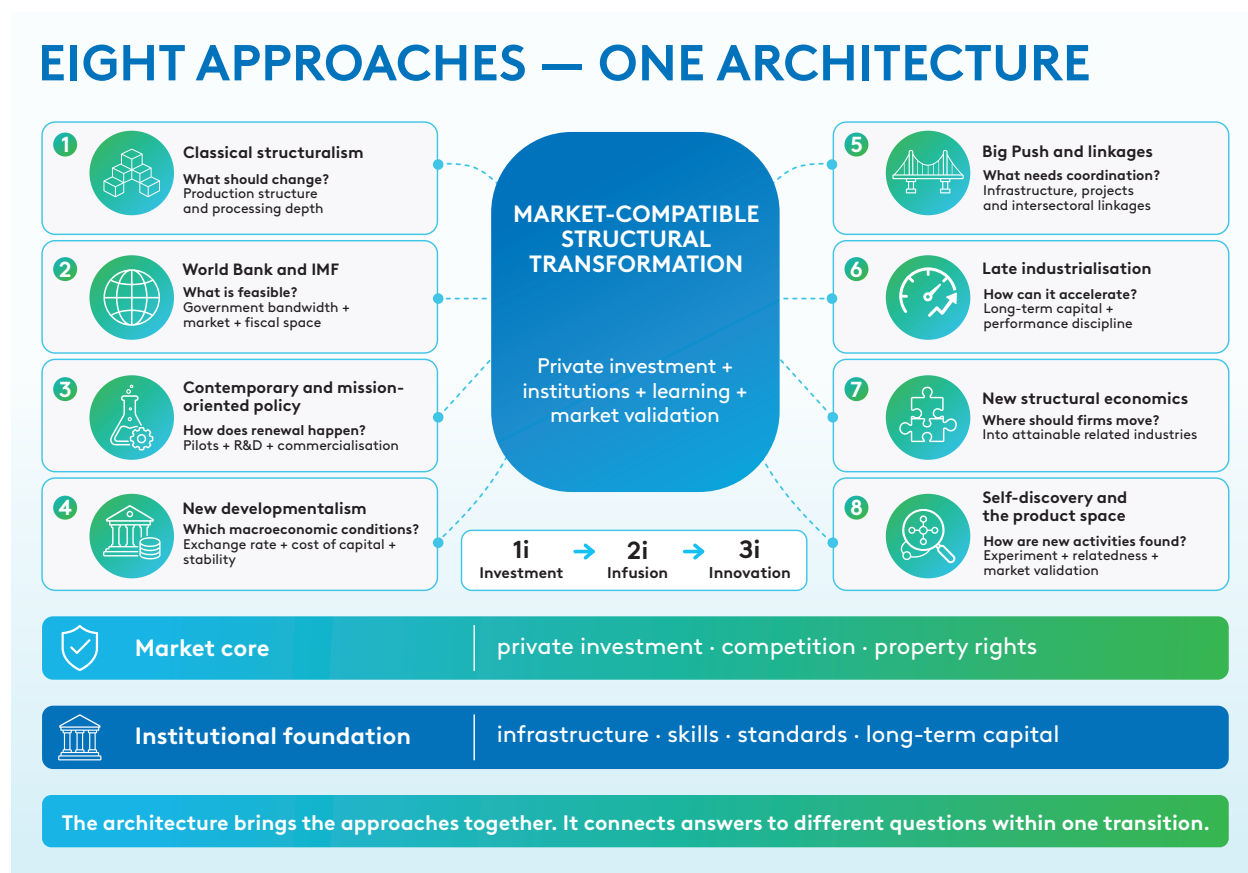
Attaining and sustaining high-income status thus requires a coordinated shift in the growth regime rather than a single measure. The EDB identifies macroeconomic stability, investment attractiveness, human capital, innovation and institutional quality as factors conducive to this transition (Vinokurov et al., 2025d). Investment must build an industrial platform; technological infusion must turn external knowledge into domestic production capabilities; and innovation must renew them continuously. Government policy is effective when it supports this sequence, promotes competition and entrepreneurial entry, connects firms with skills and knowledge, and withdraws support that does not generate productivity growth.

Theoretical Foundations: A Synthesis of Industrial Development Concepts

The schools of economic thought examined above form a multilayered conceptual framework for the architecture of industrial transformation. Classical structuralism explains why developing economies must change their production structure rather than merely expanding existing exports. Big Push theory highlights coordination failures and shared productive resources. Hirschman, Lewis, Gerschenkron and Kaldor explain intersectoral linkages, labour reallocation, financial architecture and manufacturing's role as a vehicle for productivity growth.

The East Asian literature shows that industrial policy effectiveness depends on institutional quality rather than intervention scale: competence, embedded autonomy, links with business, transparent incentives, export discipline and the ability to discontinue ineffective measures. *New structural economics* establishes feasibility and movement along related production paths. *Self-discovery theory* explains why entrepreneurial search may be insufficient without mechanisms to reduce systemic barriers. *The product-space approach* provides a tool for mapping the industrial transition from existing capabilities to new opportunities.

↓ Figure 3. The theoretical compass: which industrial transformation question does each approach address?



Source: compiled by EDB experts based on the literature reviewed in Section 2 of the report.

New developmentalism restores macroeconomic conditions to the centre of analysis: exchange rates, the cost of capital, fiscal sustainability and the Dutch disease. Contemporary industrial policy theory adds innovation, digitalisation, environmental performance and mission-oriented approaches, while requiring their integration into a phased industrial architecture. Finally, the World Bank and IMF provide a pragmatic framework for instrument selection based on government bandwidth, market scale, fiscal space, competition, transparency and evaluation.

This synthesis establishes the foundations of the proposed architecture.

First, industrial development should be understood as structural transformation, not simply an increase in industry's share of GDP. Its purpose is to accumulate production capabilities, deepen processing, increase domestic value added, expand engineering capabilities and create a more sophisticated export basket.

Second, markets remain the primary mechanism for testing efficiency. Private firms invest, bear entrepreneurial risk, compete and demonstrate the viability of production niches. Public institutions should not substitute for this mechanism; their function is to reduce barriers that prevent private investment from entering more sophisticated activities.

Third, sector selection must be portfolio-based and testable. It cannot be an administrative list of "winners" or mechanical adherence to existing commodity specialisation. Promising activities must pass filters for demand, scale, relatedness, infrastructure readiness, workforce capacity, financial viability and institutional feasibility.

Fourth, horizontal conditions and vertical measures should be complementary. Macroeconomic stability, property rights, infrastructure, standards, education, competition and access to finance create the basic environment. Vertical measures are justified only when they address a specific failure and are embedded in transparency, KPIs, time limits and regular evaluation.

Fifth, contemporary industrial policy must be compatible with external openness. Domestic and regional markets provide initial scale, but external markets, technologies, standards and competition are essential to test efficiency and prevent inefficient structures from becoming entrenched.

Sixth, innovation, digitalisation, advanced materials, clean technologies and mission-oriented programmes should be treated as modules that strengthen the industrial base. In most developing economies, they complement the stages of industrial accumulation by improving the productivity, quality, technological sophistication and export readiness of emerging industries.

Seventh, industrial policy should be designed to change the growth mechanism. At early stages, it enables investment and basic production capabilities; at the intermediate stage, technological infusion, adaptation and knowledge diffusion across firms; and at the mature stage, domestic innovation and commercialisation. Human capital is a cross-cutting constraint on all three transitions. Industry, the innovation system and skills policy should therefore be designed as a single architecture rather than three independent areas.

The theoretical foundation is thus a market-compatible architecture of structural transformation. Its core is private initiative, competition and entrepreneurial discovery; its institutional framework comprises infrastructure, standards, skills, long-term financing, project preparation, property rights protection and transparent rules; its discipline rests on market validation, KPIs, temporary incentives and the ability to abandon ineffective solutions. This combination enables developing economies to move from low-value-added activities to a more sophisticated industrial system without replacing markets with administrative selection.

3.

THE ARCHITECTURE OF INDUSTRIAL TRANSFORMATION IN DEVELOPING ECONOMIES



Sections 1 and 2 showed that industrial development remains a central mechanism of structural transformation, but its contemporary logic differs both from the nineteenth-century transition and from the relatively linear East Asian trajectories of the twentieth century. An architecture for the twenty-first century must account for historical lessons, initial conditions, institutional and financial feasibility, market scale, international cooperation, competition and technological renewal.

The proposed architecture assumes that industrial modernisation is neither a matter of waiting for spontaneous market-led upgrading nor of administratively picking “winners”. It describes a market-compatible transition from commodity-export and low-value-added production towards a structure that delivers productivity, quality employment, deeper processing, export expansion and reduced dependence on critical imports.

In macroeconomic terms, the proposed architecture addresses the shift in developing economies’ growth mechanism: from accumulating production capabilities to technology absorption and innovation, creating conditions for attaining and sustaining high-income status. The industrial platform is the channel of transformation; human capital enables the absorption and creation of knowledge; competition and external validation provide selection mechanisms; and institutions and long-term financing overcome coordination barriers.

Industry remains the core of transformation because of dense links among raw materials, energy, materials, equipment, transport, science, engineering capabilities, standards, services and exports, rather than an aim to make it artificially dominant. The World Bank and IMF clarify that policy is effective only within a framework of macroeconomic stability, competition, property protection, infrastructure, human capital and accountable institutions, with instruments depending on market size, government bandwidth and fiscal space (Fernandes and Reed, 2026; Deléchat et al., 2024).

The architecture combines sequencing, portfolio-based opportunity selection, infrastructure, cooperation, institutions and financing. It is a system for removing barriers to private investment, entrepreneurial discovery and competitive validation, rather than centralised management.

The architecture rests on three principles.

First, industrial development is not a rigid linear sequence: trajectories depend on resources, markets, capabilities, infrastructure, human capital, financial conditions and institutional quality.

Second, industrial policy is broader than incentives. It aligns production, infrastructure, workforce, financial, regulatory and external economic dimensions around projects tested for demand, scale, relatedness, private co-financing and competitiveness.

Third, digital, environmental and innovation elements should strengthen rather than replace the industrial base. Digitalisation, advanced materials, resource efficiency, industrial AI and technology niches are effective when embedded in the industrial platform and when they improve its productivity, quality and export readiness.

Scope, Objectives and Boundaries of the Architecture

The architecture concerns not an individual industry or industry's share of GDP, but the accumulation of production capabilities: firms' and ecosystems' ability to produce more sophisticated goods, retain more value added, create skilled employment and suppliers, meet standards, enter external markets and advance towards higher-value-added production.

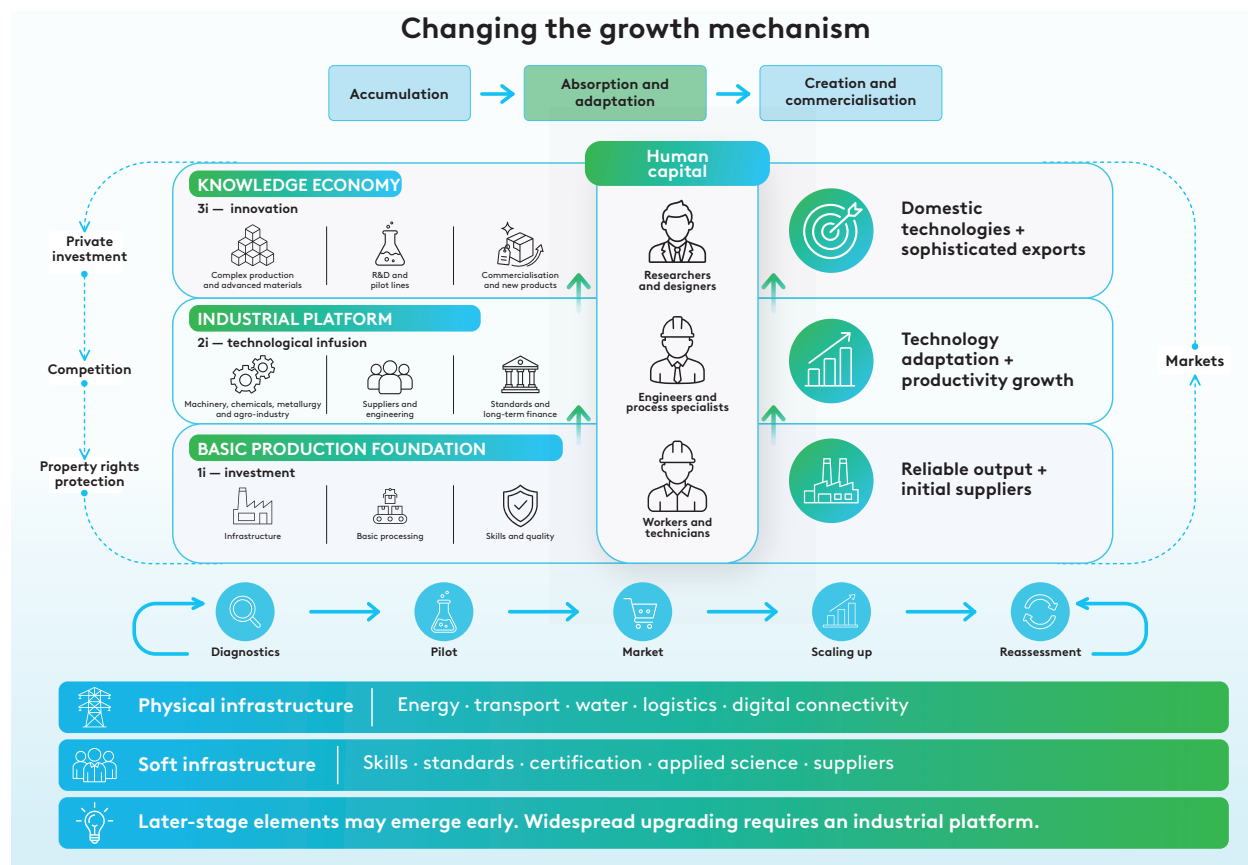
Industrial development encompasses not only final products, but also components, production services, repair, engineering, applied research, quality systems, metrology, certification, skills, project preparation, logistics, export support and financing mechanisms for long investment cycles.

The architecture aims to provide developing economies with an operational framework for industrial transition. It should answer four questions:

- What is the starting base for industrial development?
- Which industries and technological activities are not only desirable, but also feasible under these conditions?
- What is the sequence from basic production to platform industries and then to more sophisticated technology segments?
- Which institutions, infrastructure and financial mechanisms make this path practically achievable?

The architecture organises industrial policy into a sequence of testable steps: diagnostics–selection–piloting–scaling up–evaluation–adjustment or withdrawal of ineffective measures.

↓ Figure 4. The architecture of industrial transformation: from investment to technological infusion and innovation.



Source: compiled by EDB experts.

The architecture does not prescribe the same path or industries for every country, replace national strategies, business decisions or project appraisal, or guarantee success. It distinguishes near- and medium-term opportunities from long-term technology options and establishes realistic sequencing.

Its common principles are structural transformation, sequencing, alignment with initial conditions, property protection, competition, selection discipline, market validation, coordination with infrastructure, institutions and financing, and regular evaluation.

Modules, Stages, Branching Paths and Transitions

The architecture of industrial transformation is organised around three stages:

- 1) laying a basic production foundation (corresponding to 1i – investment);
- 2) building an industrial platform (corresponding to 2i – technological infusion);
- 3) moving towards a knowledge economy and technological upgrading (corresponding to 3i – innovation).

This is not a permanently fixed ladder: later-stage elements can emerge earlier, but are sustainable only with a basic industrial foundation. Digital firms, laboratories, engineering schools and start-ups can exist at early stages, yet widespread upgrading requires suppliers, standards, equipment, certification, skills, project finance and demand.

Several modules operate within this architecture.

- Sectoral modules develop specific production activities: raw materials processing, agro-processing, machinery manufacturing, chemicals, metallurgy, electrical engineering, pharmaceuticals, medical devices, packaging, industrial services, engineering, advanced materials and other activities.
- The institutional module covers the rules governing interaction among business, financial institutions, the research and education community, and the public sector. Its task is not to manage firms, but to reduce coordination costs, close regulatory and information gaps, support quality infrastructure, enable project preparation and organise feedback and evaluation.
- The financial module includes long-term capital, project finance, development banks, IFIs, PPPs, export credit, guarantees, bond markets, private investment and risk-sharing instruments. Its principle is that financing should follow project maturity, while public instruments should catalyse private capital rather than replace it.
- The infrastructure module is treated separately because industrial policy loses its practical foundations without it. Infrastructure is a shared productive resource: it reduces costs, improves production reliability, expands markets, improves supplier access and enables projects to scale up.

Investment in shared-access infrastructure — transport, energy, logistics, water, digital connectivity, industrial sites, quality infrastructure and workforce development — is among the most market-compatible industrial policy instruments. IMF estimates associate additional public infrastructure investment of 1% of GDP with an increase in long-term output of approximately 1.5% in advanced economies and 3.5% in developing economies (IMF, 2025). This concerns creating conditions available to many market participants, rather than financing individual firms.

Physical infrastructure comprises energy, transport, logistics, warehousing capacity, industrial sites, utility networks, water supply, cold chains and physical digital connectivity.

Soft infrastructure comprises standards, certification, metrology, technical regulation, vocational and engineering training, applied science, quality institutions, export and investment support, project offices, supplier-development programmes and monitoring systems.

Physical infrastructure provides production connectivity. Soft infrastructure provides production compatibility and confidence in quality. Without the former, industrial development becomes costly and fragmented; without the latter, it lacks technological coherence, is difficult to scale and remains confined to the domestic market.

Box 3. Infrastructure as a source of TFP and GDP growth

The principal effect of infrastructure development is to increase potential output and total factor productivity (TFP).

Transport and logistics reduce “economic distance”, expand markets and improve access to suppliers. A 10% increase in transport infrastructure in developing economies is associated with a 0.1% increase in output, 0.2% in employment and 0.26% in trade ([Foster et al., 2023](#)). A 1% increase in road density can contribute to a 0.25% rise in industrial firms’ TFP ([Kailthya and Kambhampati, 2022](#)).

Logistics infrastructure efficiency is also critical. Each additional day of shipping delay reduces trade by at least 1% and is equivalent to increasing a country’s average distance from its trading partners by 70 km ([Djankov et al., 2006](#)). These effects are more significant for landlocked countries: their export logistics costs can be 63% higher than those of transit developing countries, and import costs 75% higher ([UN-OHRLLS, 2025](#)).

Reliable energy reduces downtime, raises capacity utilisation and enables more efficient capital use. Manufacturing firms in developing countries that face electricity outages and constraints have, on average, 11% lower TFP ([Apeti and Ly, 2024](#)).

Digital infrastructure reduces transaction costs and accelerates supply-chain coordination. In least developed countries, landlocked developing countries and small island developing states, a 10% increase in broadband penetration can contribute to a 2.0–2.8% increase in GDP per capita ([UN-OHRLLS and ITU, 2019](#)).

Water scarcity and deteriorating water quality affect output through lower agricultural productivity, higher water-treatment costs, health risks for workers and unstable production chains. Climate-amplified water scarcity could cost some regions up to 6% of GDP by 2050 relative to a scenario without water stress, while deteriorating water quality can reduce potential growth by up to one-third in the most polluted areas ([World Bank, 2016](#)). Declining water resources, for example, reduce industrial firms’ TFP in China by 1.93–5.4% ([Yu et al., 2026](#)).

For an industrial firm, a standard often acts as a “passport” to a market. In developing economies, the absence of internationally recognised certification raises transaction costs, increases information asymmetry between sellers and buyers and restricts access to export orders. A study of firms in 89 developing and transition economies showed that international standards certification stimulates exports by reducing transaction costs and raising productivity ([Goedhuys and Sleuwaegen, 2016](#)). Research using World Bank Enterprise Survey data for 33 countries found that ISO 9001:2015 certification increased firms’ total sales by 48.3% ([Wayoro et al., 2025](#)).

The importance of different infrastructure types changes by stage. At the first stage, priorities are basic energy, logistics, industrial sites, workforce skills and basic quality infrastructure. At the second, they are specialised production sites, testing centres, engineering education, supplier-development programmes and export certification. At the third, they are research centres, pilot lines, shared-use facilities, advanced quality infrastructure, R&D institutions and more sophisticated financial and regulatory mechanisms.

This approach is consistent with the World Bank framework, which treats industrial parks, skills development, market-access support and quality infrastructure as basic and relatively widely applicable industrial policy instruments ([Fernandes and Reed, 2026](#)).

The architecture must also incorporate cross-cutting production and technology elements. These progressively strengthen the industrial centre of gravity without changing it.

The digital component is the most important. It should be treated as a tool for making the production base more efficient, rather than as a separate sector competing with industry. At early stages, it comprises basic automation, digital record-keeping, quality control and supply traceability. At the industrial-platform stage, it includes ERP/MES systems, the industrial Internet of Things, data-driven quality and supply management, and predictive equipment maintenance. At maturity, it includes industrial AI, digital twins, robotics, sensors, integrated production-data management and advanced industrial software.

Similarly, more sophisticated materials and resource-efficient and environmentally efficient solutions should primarily be treated as ways to deepen processing and improve the quality and competitiveness of basic industries. For most developing countries, their economic purpose is to strengthen the industrial platform rather than attempt to replace it prematurely.

↓ Table 3.1. Stages of the architecture of industrial transformation: objectives, sectoral modules, systemic conditions and transition indicators

Stage of the architecture	Stage objective	Sectoral modules	Physical infrastructure	Soft infrastructure	Cross-cutting contemporary elements	Transition conditions and indicators
Stage I. Laying the foundations for industrialisation	Create a basic industrial environment: bring resources and labour into production, initiate processing and reduce dependence on imported basic goods.	Agro-processing and food processing; basic construction materials; primary and secondary raw materials processing; basic chemicals; simple metal and plastic products; industrial equipment repair and servicing; limited assembly activities.	Reliable energy; transport access; industrial sites; utility networks; water supply; warehousing and basic logistics infrastructure; digital connectivity in industrial zones.	Basic technical regulation; certification and metrology; vocational training; basic programmes in production management, quality culture, equipment operation and maintenance; workplace learning; investor support; export and market support; initial long-term financing instruments for shared productive resources.	Basic automation; digital record-keeping; quality control; traceability; simple energy-efficiency and loss-reduction solutions.	Sustained output growth in basic segments; initial clusters and supplier networks; operational industrial sites; basic quality infrastructure; verified demand for scaling up; sustained labour productivity gains and fewer defects and less downtime; demonstrated ability of firms to absorb standard technologies.
Stage II. Building an industrial platform	Move from fragmented production to interconnected medium-technology platform industries and deeper processing.	Machinery manufacturing; transport and electrical equipment; chemicals and polymers; high-value-added metallurgy; pharmaceuticals and medical devices where a regulatory base exists; sophisticated agro-processing; packaging; industrial services and engineering.	Specialised industrial parks; testing and certification capacity; reliable container and warehouse logistics; dependable energy and utility networks; an industrial digital environment.	Engineering education; sectoral competence centres; supplier-system development; advanced quality infrastructure; export and investment agencies; project offices; long-term credit and project finance; technology extension services for firms; applied laboratories; joint business-university engineering programmes; specialist mobility mechanisms.	ERP/MES integration (<i>Enterprise Resource Planning/Manufacturing Execution System</i>); industrial Internet of Things; predictive maintenance; digital quality and supply management; advanced materials and speciality chemicals as extensions of the basic industrial platform.	A growing share of intermediate-value-added production; durable supplier networks; export discipline; reduced dependence on critical imports; capacity to finance long production cycles; mature KPIs and <i>project/programme</i> exit rules; TFP growth in priority industries; a rising share of certified suppliers; demonstrated technology absorption and adaptation; higher revenue from products new to the firm.

Stage III. The knowledge economy and technological upgrading	Create an innovation-intensive industrial system in which R&D, engineering solutions and technology niches rest on a mature industrial platform.	Sophisticated machinery manufacturing; advanced chemicals; advanced materials; selected electronics and instrument-making niches; biopharmaceuticals; medical equipment; clean-technology segments linked to industrial equipment, energy storage, resource efficiency and circular solutions.	Research centres; pilot lines; shared-use facilities; experimental production; computing and digital capacity; specialised testing facilities.	R&D institutions; advanced quality infrastructure; intellectual property protection and commercialisation; regulatory regimes for new technologies; venture and quasi-venture instruments; technology consortia; technology transfer, <i>proof of concept</i> and pilot scaling; commercialisation offices; industrial doctoral programmes; talent attraction and return mechanisms.	Industrial AI; digital twins; robotics; sensors; advanced materials; biotechnology and pharmaceutical niches; environmental and resource-efficiency solutions built upon the industrial base.	A mature Stage II platform; established R&D and engineering centres; technology commercialisation capacity; exports of sophisticated products and engineering solutions; manageable innovation risks; a sustained share of private R&D; commercialisation of developments; exports of technologies, licences and sophisticated engineering services; ability to create competitive products without permanent protection.
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Source: compiled by EDB experts.

Initial Diagnostics

In the proposed architecture, initial diagnostics precede the selection of sectoral activities and instruments. Their purpose is to determine which type of industrial transition is realistic given a country's resources, capabilities, markets, institutions and financial constraints.

Diagnostics should assess at least nine parameters:

- 1) the resource and energy base;
- 2) the size and structure of the domestic market;
- 3) access to regional and external markets;
- 4) the existing production base and depth of processing;
- 5) the quality of human capital;
- 6) the state of physical infrastructure;
- 7) the state of soft infrastructure;
- 8) the product and technological relatedness of potential new activities to the country's accumulated capabilities;
- 9) the institutional and macro-financial feasibility of the strategy: government bandwidth, fiscal space, the cost of capital, property rights protection and macroeconomic stability.

Initial diagnostics must produce an operational result. Their purpose is not a descriptive overview, but to identify which industrial activities are feasible in the near term, which require prior infrastructure and institutional development, which are possible only through cooperation, and which remain long-term technology options.

This step distinguishes industrial strategy from sectoral aspirations. An activity without verified demand, resource access, technological relatedness, infrastructure, skills, financing and institutional feasibility should not be a near-term priority, even if attractive from a long-term technology perspective.

Market Scale and External Integration as Systemic Conditions for Industrialisation

Market scale plays a structural role in industrial policy. For many manufacturing activities — especially capital-intensive, series-production activities requiring supplier networks — sustainability depends on reaching a sufficient volume of demand. This can come from domestic, regional or export markets, but the scale constraint does not disappear.

For small and medium-sized developing economies, cooperation and external integration are therefore part of the foundational industrial logic rather than later additions. Domestic markets can provide initial demand and economies of scale, regional cooperation can expand markets and allocate production roles, and external openness can provide access to technologies, equipment, standards and competitive testing.

Box 4. The critical importance of domestic market size and regional integration for industrialisation

[Goldberg and Reed \(2023\)](#) quantify industrial development's sensitivity to the scale of effective demand. In their model, the market threshold for a closed economy with low purchasing power corresponds to a population of around 325 million; participation in international trade reduces it to 179 million and, under certain assumptions, to 126 million. These figures should not be treated as universal demographic requirements; they illustrate why small domestic markets sharply constrain series production and capital-intensive industries. For small countries, exports effectively extend the market beyond national borders, while regional integration enables countries to pool demand, distributes production functions and enables minimum efficient scale. Without such access, economies are more likely to concentrate on narrow niches, commodity exports or assembly, whereas more sophisticated chains require external markets, compatible standards and reliable logistics.

External integration must nevertheless serve a productive purpose. Participation in external value chains is beneficial when it brings technology, standards, learning and higher domestic value added. If it entrenches a country in low-level assembly or commodity exports, no industrial transition occurs. The task is therefore to combine domestic markets and openness: domestic and regional markets provide scale, while external openness imposes technological and competitive discipline. This combination grounds industrialisation in real markets, while preserving the long-term objective of a more sophisticated production structure.

The proposed architecture deliberately avoids rigid universal scale thresholds by industry. In most activities, minimum efficient scale depends on technology, chain configuration, export share, cost structure and the form of cooperation. It is therefore more appropriate to use ranges established through sectoral and project-level assessments.

Stage I: Laying the Foundations for Industrialisation

The first stage creates a basic production foundation. Its task is not to move immediately into the most sophisticated segments, but to establish an environment in which industrial growth becomes sustainable, reproducible and attractive to private investment.

This stage typically focuses on agro-processing and food processing, basic construction materials, primary and secondary raw materials processing, selected basic chemical segments, simple metal and plastic products, industrial equipment repair and servicing, limited assembly where economically justified, and basic production services.

Physical infrastructure is paramount: reliable energy supply, transport connectivity, industrial sites, warehouse logistics, water supply, utility connections and basic digital connectivity for firms and industrial zones. Without these conditions, even commercially promising projects face excessive costs and risks.

Soft infrastructure is also necessary, initially in basic form: technical regulation, certification, metrology, vocational training, project facilitation, export and investment support, and initial long-term financing instruments for shared productive resources.

First-stage industrial policy should be focused and pragmatic. Its purpose is to establish initial production capabilities rather than cover as many industries as possible. Priority goes to instruments that create conditions for many firms: industrial sites, basic quality infrastructure, skills programmes, logistics, energy access, investor support, standards and project preparation.

Contemporary cross-cutting elements are integrated functionally. Digitalisation enters through basic automation, digital record-keeping, quality control and supply traceability. Resource-efficiency solutions reduce losses and costs. Environmental solutions improve energy efficiency, reduce waste and facilitate access to markets where these attributes are commercially significant. At the first stage, such elements should strengthen the industrial base rather than distract from building it.

Technological learning begins at the first stage, primarily in operational form: mastering equipment, organising production flows, maintenance, quality control, reducing defects and losses, digital record-keeping and standards compliance.

Stage I human capital is therefore more than a general stock of education; it is a broad system of practical skills comprising skilled workers, supervisors, technicians, maintenance specialists and line production managers. Progress to Stage II is impossible unless firms can consistently reproduce quality and raise productivity using already available technology.

First-stage success is confirmed by tangible signs of industrial take-off: more reliable production, initial clusters and supplier systems, reduced dependence on critical imports in basic segments, employment growth, wider production discipline, minimally functional quality infrastructure and projects ready to scale up.

Stage II: Building an Industrial Platform

The second stage begins when an economy moves beyond fragmented basic production towards an industrial platform. Medium-technology industries take centre stage, creating dense intersectoral linkages and demand for more sophisticated materials, components, equipment, engineering solutions and production services.

For most developing countries, typical Stage II activities include medium-technology machinery and electrical equipment, deeper chemical processing, high-value-added metallurgy, production complexes based on advanced materials, pharmaceutical and medical-technology activities where regulatory and scientific foundations exist, sophisticated agro-processing, packaging, industrial services and engineering.

These activities are selected not by simply “designating” them as priorities, but by requiring several conditions simultaneously: verified demand, intersectoral multiplier effects, links to existing capabilities, supplier-development potential, export or regional market testing, access to finance and institutional feasibility.

The second stage gives greater importance to more sophisticated instruments: competitive co-financing, supplier-development programmes, technological learning mechanisms, offtake contracts, competitive procurement, export credit, guarantees, project finance and selected tax incentives. The risk of sectoral interests capturing policy also rises sharply at this stage. All incentives must therefore be linked to measurable outcomes: productivity, exports, quality, private co-financing, the share of domestic value added, new technological processes and supplier development.

Infrastructure requirements become more complex. Physical infrastructure includes specialised industrial sites, reliable container and warehouse logistics, testing and certification capacity, dependable energy and utility networks for medium-technology production, and an industrial digital environment. Soft infrastructure increasingly depends on engineering education, applied competence centres, supplier-development programmes, quality infrastructure, sectoral project offices, export and investment institutions, long-term capital and project finance.

Cross-cutting enabling elements become systemic at the second stage. Production digitalisation — automation, ERP/MES integration, data-driven supply and quality management, and industrial Internet of Things applications — becomes a source of productivity growth in machinery, chemicals, metallurgy, food processing and other basic industries. More sophisticated materials and chemical products should primarily be understood as extensions and deepening of the industrial platform rather than a standalone technology programme.

Stage II's central function is technological infusion: converting imported equipment, licences, FDI and external knowledge into domestic engineering and organisational capabilities. Isolated training programmes are insufficient. Firms need a technology extension system: productivity diagnostics, assistance with standards and digital systems, access to testing, engineering advice, prototyping, supplier-development programmes and joint university projects.

Innovation at this stage is predominantly engineering-based and adaptive. Firms adjust processes to local raw materials and market scale, develop tooling and components, improve equipment reliability, reduce costs and introduce products new to them. Such improvements should be recognised as an independent focus of industrial and innovation policy, because they build absorptive capacity and the foundation for subsequent domestic R&D.

Stage III: The Knowledge Economy and Technological Upgrading

The third stage is the transition to an innovation-intensive industrial system in which R&D, domestic engineering solutions, technology commercialisation and selected new industries linked to contemporary industrial megatrends become key.

This stage does not abandon industry's central role; rather, industry itself enters a more sophisticated phase. The production base remains the focus, while the range of activities expands to knowledge-intensive machinery, high-technology chemicals, advanced materials, niche electronics, instrument making, industrial robotics, biotechnology, biopharmaceuticals, medical equipment, energy-storage equipment, resource efficiency and circular-economy solutions.

These activities should develop on the industrial platform rather than replace it. The EDB identifies biotechnology and longevity, robotics and autonomous systems, the space economy, virtual reality, energy storage and climate adaptation as long-term technology priorities (Vinokurov et al., 2026b). Within the proposed architecture, these activities build upon the second-stage industrial platform, raising the industrial system's technology intensity, productivity, quality and export potential.

Stage III physical infrastructure combines research centres, pilot lines, shared-use facilities, high-performance computing capacity, specialised testing facilities, experimental production and demonstration-project sites.

Soft infrastructure rests on developed R&D institutions, intellectual property protection and commercialisation mechanisms, advanced quality infrastructure, specialised regulatory regimes, technology consortia, venture and quasi-venture instruments, and innovation-risk assessment systems.

Third-stage maturity is measured not by R&D expenditure or the number of technology organisations alone, but by the industrial system's ability to turn knowledge systematically into commercial results. This appears in revenue growth from new products, private investment in development, patents and know-how, licensing, technology-company formation, pilot-line scaling, and exports of sophisticated products and engineering services. Domestic innovation capacity also includes the ability to integrate external knowledge: technological autonomy is not isolation, but the capacity to select, absorb, modify and, where necessary, replace critical solutions deliberately.

The third stage should not promote an ideology of skipping stages. For most developing economies, the main risk is attempting costly high-technology programmes without a second-stage platform. Innovation and mission-oriented instruments should therefore develop through a portfolio of pilot projects, commercial and technological validation, private co-financing and regular evaluation.

Selecting Priority Industries: A Selection Methodology

A key element of the architecture is a more rigorous and reproducible procedure for selecting sectoral activities. Its underlying principle is that industrial policy instruments should target activities that simultaneously offer market potential, technological attainability, links to existing capabilities, intersectoral effects and institutional feasibility.

The methodology comprises five steps:

Step 1. Segment activities by stage.

Potential activities are first allocated to three horizons: basic activities for Stage I, platform activities for Stage II, and prospective niche and technological activities for Stage III. This prevents industries at different maturity levels from being compared on the same basis and keeps near-term industrial-base objectives distinct from long-term technology goals.

Step 2. Apply preliminary feasibility filters.

Before scoring, an activity must pass five preliminary filters: attainable market scale; critical production resources, including energy, skills and existing capabilities; technological and product relatedness; infrastructure readiness; and institutional and financial feasibility. Failure on any critical filter does not remove an activity from the long-term agenda, but prevents it from becoming a near-term priority until the constraint is addressed.

Step 3. Calculate a weighted assessment.

Activities passing the preliminary filters undergo an extended assessment against eight criteria (see *the methodology in [Appendix 1](#)*):

- resource, energy and capability base (K1);
- market potential (K2);
- multiplier effect (K3);
- contribution to supply-chain resilience and reduced dependence on critical imports (K4);
- export competitiveness (K5);
- product-space alignment (K6);
- cooperation potential (K7);
- infrastructure and financial feasibility (K8).

The core scoring is followed by an additional technological-learning diagnostic profile. It assesses whether the module creates a durable channel for knowledge accumulation by answering five questions: does it generate broad demand for engineering and technical skills; is progression from operation to design and development possible; do domestic suppliers and specialised services emerge; is there scope for process and product innovation; and does knowledge diffuse to other industries?

This profile is not mechanically included in the final score, to avoid duplicating criteria and creating false precision. It is a mandatory qualitative check before piloting and scaling up, and determines accompanying skills, applied-science and technology-development measures. A module with strong commercial potential but weak learning effects may remain a source of income or an infrastructure link, but should not automatically be treated as the principal mechanism for moving from the second to the third stage.

Step 4. Build a portfolio of industrial opportunities.

The assessment should produce a portfolio in three “baskets” — basic production opportunities, platform activities and strategic future niches — rather than a single “champion”. This reduces excessive dependence on one industry and combines near-term feasibility with long-term technological prospects.

Step 5. Pilot, scale up and reassess.

Even well-selected activities should not automatically receive large-scale support. Selection is followed by piloting: an experiment limited in resources and duration, with predefined KPIs. Scaling up is possible only when demand, productivity, quality, investment feasibility and private-sector interest have been confirmed.

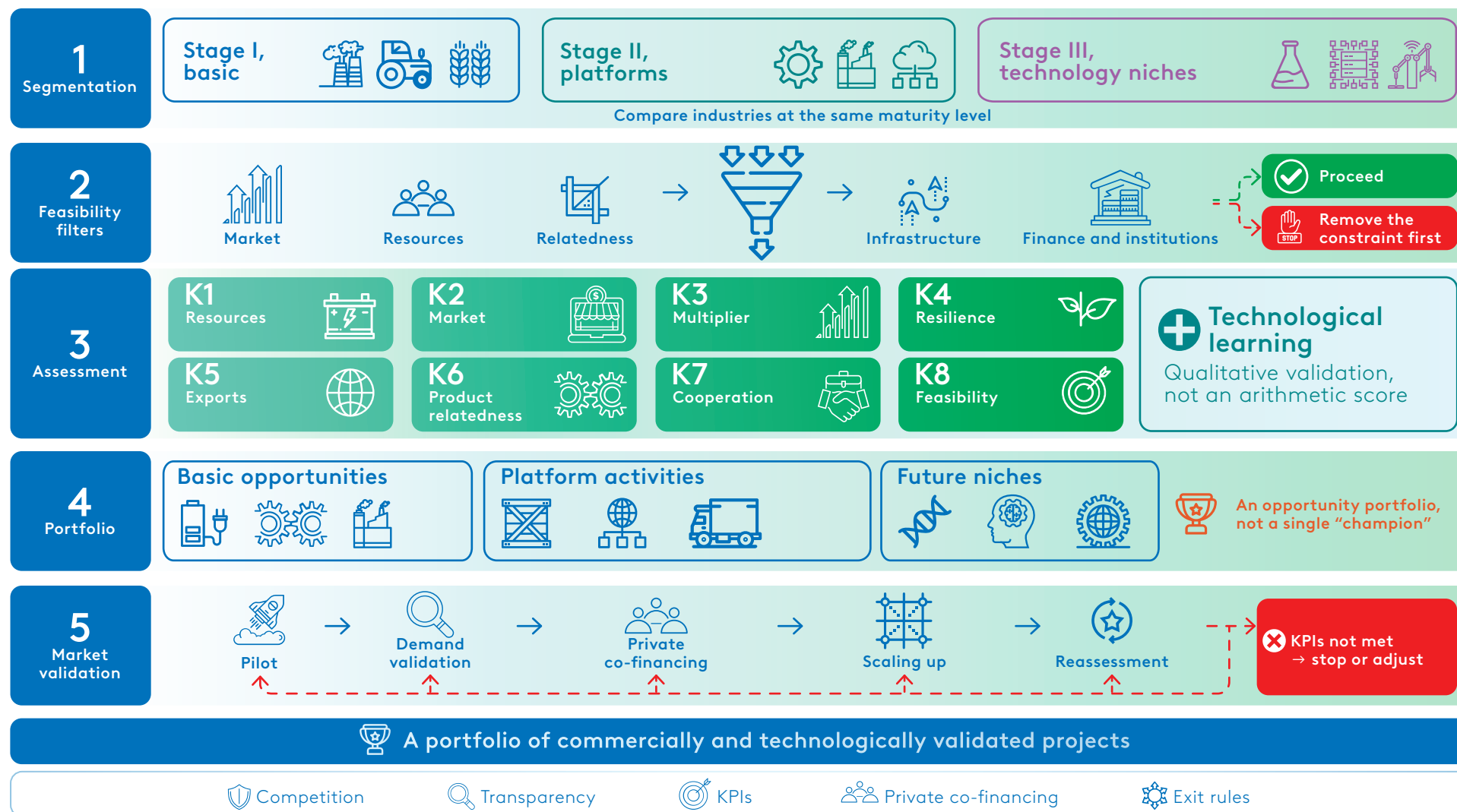
Infrastructure readiness and cross-cutting enabling modules are embedded in the selection process without changing its industrial focus. An activity lacking energy, logistics, standards, skills or long-term capital cannot be a near-term priority. Digital or more sophisticated technological elements that remain detached from basic industries rather than strengthening them should likewise not automatically receive active industrial incentives.

This methodology preserves the architecture’s industrial focus while carefully integrating contemporary elements without dispersing the strategy ([Hausmann and Rodrik, 2003](#); [Hidalgo and Hausmann, 2009](#)).

↓ Figure 5. Sectoral module selection methodology: from initial diagnostics to piloting and scaling up.

From a sectoral idea to a scalable project

Five steps for selecting priority sectoral modules



Source: compiled by EDB experts.

↓ Table 3.2. Industrial policy instruments by feasibility: government bandwidth, domestic market size and fiscal space

Feasibility profile	Country/stage characteristics	First-choice instruments	Second-line instruments (requiring greater caution)	Application logic and constraints
Weak government bandwidth + small market + limited fiscal space	The most limited set of options. Primarily suited to Stage I and narrow niches where bottlenecks can be removed quickly.	Industrial parks and ready-to-use production sites, basic infrastructure, investor coordination and simple one-stop-shop services.	Broad tariffs, tax holidays, large subsidies and complex innovation programmes are not recommended: they carry high risks where administrative capabilities are weak.	Focus on shared productive resources and infrastructure bottlenecks. Sectoral support only through pilot projects and cooperative access to external markets.
Adequate government bandwidth + small market + limited fiscal space	The country can administer targeted measures, but lacks sufficient domestic demand and fiscal resources for major incentives.	Workforce training and development, market-entry assistance, quality infrastructure, export certification, supplier-development programmes and industrial parks.	Limited export incentives and special regimes are possible only with a clearly identified market and minimal fiscal cost.	The central principle is cooperation and export orientation. Most relevant to small economies and niche industries.
Limited government bandwidth + large market + limited fiscal space	Domestic demand provides scale, but weak administrative capacity limits sophisticated instruments.	Industrial sites; basic logistics; simple localisation rules in selected segments; standards for mass markets.	Tariffs, production-localisation requirements, restrictions on raw materials exports and technology-transfer obligations in exchange for market access are permissible only in targeted cases with strict cost control.	A large market allows platform industries to emerge, but limited administrative capabilities require simple design and external performance testing.
Adequate government bandwidth + large market + limited fiscal space	Stage II becomes possible: the market is large enough for platform industries, although fiscal constraints remain.	Quality infrastructure and workforce development, supplier-development programmes, market-entry support, industrial parks and technological support for investors.	Technology transfer through market access, localisation requirements, import tariffs and public procurement can be used selectively.	Rely on non-fiscal and low-cost instruments. The aim is an industrial platform without permanent budget support.
Adequate government bandwidth + ample fiscal space; medium-to-large market	A broader toolkit. Relevant to mature Stage II and a limited range of Stage III activities.	Industrial and targeted innovation subsidies, R&D support, public procurement, project finance, development funds and export credit.	Subsidies, public procurement, tax incentives and innovation programmes must rest on KPIs and automatic termination mechanisms. Tax preferences must be transparent and subject to ex ante and ex post effectiveness assessments.	Instruments should target a portfolio of priorities rather than being applied broadly. Competition, safeguards against rent-seeking and the ability to discontinue ineffective measures are necessary.

Source: compiled by EDB experts based on [Fernandes and Reed \(2026\)](#).

The Institutional Architecture of Industrial Transformation

Industrial policy requires its own institutional architecture. It cannot be implemented through fragmented sectoral incentives, uncoordinated infrastructure projects or isolated agency programmes. Yet this architecture must not become an administrative command centre for the economy. Its purpose is a predictable and accountable system for coordinating the conditions for private investment and project implementation.

A coordination platform involving business, financial institutions, research and education organisations, and the public sector should be placed at the centre of the architecture. It should connect industrial opportunities with infrastructure, education, science, financing, standards and external-economic conditions. Its effectiveness depends not on the extent of its powers, but on its ability to ensure sequencing, selection, monitoring, feedback and policy adjustment.

Partnership among business, the research and education community, financial institutions and the public sector remains central. It must become operational through sectoral councils, competence centres, technology platforms, applied workforce-training programmes, supplier-development programmes and feedback mechanisms linking producers, investors, researchers and regulators.

Attaining and sustaining high-income status requires a dedicated industry–skills–applied science–commercialisation framework within the architecture. Its purpose is to translate sectoral priorities into specific capability and knowledge requirements. Each priority module should have a map of occupational and technology gaps; joint programmes involving firms, colleges and universities; technology extension and shared-use centres; sectoral supplier-development programmes; industrial placements for teachers and students; competitive applied R&D schemes co-financed by business; intellectual property access rules; and pilot-deployment mechanisms.

The coordination platform should assess not only budget execution and capacity commissioning annually, but also learning outcomes: productivity growth, the number of firms adopting new processes, the share of certified suppliers, the proportion of graduates employed in their field, engineer mobility, commercialisation and revenue from new products. This turns partnership from a consultative arrangement into a production mechanism.

Soft-infrastructure institutions have a distinct role: export and investment promotion agencies, quality-control services, certification and metrology centres, education and applied research centres, project offices and monitoring systems. They make industrial policy measures predictable, transparent and verifiable.

Property rights and contractual protection of investment are essential. Without them, entrepreneurial discovery will not take off: private investors will not bear long-term production risks if successful outcomes can be arbitrarily revised, appropriated or burdened by unpredictable regulation. The institutional architecture must therefore provide not only coordination, but also predictable rules, transparency, non-discriminatory access to measures and orderly exit from ineffective projects.

The Financial Architecture of Industrial Transformation

The financial architecture assumes that the mix of instruments must match project maturity. Financing should neither run ahead of project readiness nor replace market validation. Its purpose is to reduce systemic risks, extend investment horizons, attract private capital and make commercially viable projects bankable.

At Stage I, priority financing goes to shared productive resources: industrial sites, utility and transport infrastructure, standardisation, skills programmes, and digital and energy foundations. This is the most market-compatible form of financing because it creates the right conditions for many firms and reduces infrastructure barriers.

At Stage II, long-term productive capital becomes central: development banks, modernisation credit lines, specialised funds, project finance, guarantees, export credit, insurance and co-financing mechanisms. Public and quasi-public instruments should share risks and attract private capital rather than permanently substituting for commercial finance.

At Stage III, the financial architecture should include more sophisticated mechanisms: financing for R&D, technology platforms, pilot production, demonstration projects, venture and quasi-venture funds, mission-oriented programmes, offtake contracts and long-term competitive procurement for new technologies. These instruments should be selective and used only where technological foundations, private interest, commercialisation mechanisms and transparent risk assessment exist.

Financing for technological learning should be organised through four interconnected windows:

The first covers skills and production organisation: co-financing dual education, corporate training, production management, quality-system implementation and instructor training.

The second covers technology absorption: grants or vouchers for productivity diagnostics, engineering consultancy, testing, certification, digitalisation and adaptation of acquired technology.

The third covers pilot projects and applied R&D. It provides competitive co-financing for proof of concept, prototyping, experimental lines, new materials and joint projects between industry and research and education institutions.

The fourth covers scaling up: long-term credit, guarantees, project finance and export finance for solutions that have demonstrated commercial and technological viability.

Progress between windows should be sequential. Large-scale expansion financing follows confirmation of workforce, technological and market readiness, while R&D support requires a pilot-deployment mechanism and private co-financing.

The principal financing sources are domestic private investment, bond markets, development banks, international financial institutions, public-private partnerships, export credit and insurance, foreign direct investment, joint ventures, project finance and budget instruments used primarily for shared-access infrastructure, project preparation and risk sharing. Green finance and Islamic finance instruments can supplement, rather than form the foundation of, this mix.

Financing cross-cutting enabling modules—quality infrastructure, engineering training and digital production renewal—must not be deferred to later stages. Treating them as secondary can leave a country with production capacity, but insufficient ability to upgrade, certify, export and learn technologically.

International experience shows that official development institutions play an important role in mobilising private capital. In 2024, they mobilised approximately US\$77 billion in private financing globally for developing economies on the list of countries and territories eligible for official development assistance; multilateral development banks accounted for 71% of this mobilisation ([OECD, 2026](#)).

Development banks do more than lend. They can reduce project, currency, political and regulatory risks, structure transactions, build confidence in project chains and attract private capital through guarantees, co-financing and project preparation. In this framework, development banks are platforms for turning commercially viable projects into bankable investment packages. Within the MDB system, these functions are complemented by a ‘non-investment triad’: technical assistance, analysis and research, and training programmes ([Vinokurov et al., 2026c](#)).

Industrial Policy Instruments by Country Conditions and Stage

The proposed architecture assumes that instrument selection depends on the country's development stage, market size, government bandwidth and fiscal space, consistent with the World Bank framework.

For countries with small markets, limited administrative capabilities and narrow fiscal space, the natural initial instruments are industrial parks, skills programmes, quality infrastructure, market-entry assistance, export certification, investor support and other targeted public inputs.

More sophisticated measures — production and innovation subsidies, competitive procurement, offtake contracts, tax incentives, local supplier-development requirements and special regimes — are justified only when the industrial base, markets, institutions and administrative capabilities reach a sufficiently high level ([Fernandes and Reed, 2026](#)).

Industrial policy should begin with production conditions — infrastructure, skills, quality, project preparation and market support — rather than the costliest measures. Carefully calibrated sectoral and innovation instruments can follow, subject to competition, KPIs, private co-financing, fiscal assessment and automatic support termination.

Risks, Critiques and Safeguards of the Proposed Architecture

The architecture should withstand the principal risks of industrial policy through built-in safeguards.

The first risk is sector-selection error: activities are chosen for political appeal, fashion or sectoral lobbying rather than demand, relatedness, scale, capabilities and feasibility.

The second risk is policy capture by private interests and rent-seeking. This arises when support becomes permanent, non-transparent and disconnected from performance.

The third is fiscal overextension: costly instruments are used without regard to fiscal space and expected returns.

The fourth is infrastructure misalignment: production projects are launched without adequate physical or soft infrastructure.

The fifth is a premature commitment to high-technology activities without an industrial platform.

The sixth is closed markets, which entrench inefficiency and weaken competitive testing rather than advance industrial development.

The seventh is unpredictable regulation and weak property rights protection, which reduce firms' willingness to make long-term productive investments.

The eighth is the "assembly trap". Output and exports can grow without domestic capabilities accumulating if design, key components, software, servicing and modernisation remain external. Safeguard: requirements should focus on supplier development, engineering functions, learning, services, quality and domestic value added, rather than formal local content.

The ninth is innovation window-dressing. Technology parks, laboratories and grants can remain detached from production needs and fail to generate adoption. Safeguard: mandatory links to sectoral problems, private co-financing, a pilot customer, commercialisation indicators and termination of projects without industrial applications.

The tenth is skills mismatch and talent loss. Priority industries may encounter shortages of engineers and skilled workers when scaling up, while trained personnel may lack quality jobs or emigrate. Safeguard: skills forecasts linked to the project portfolio, dual programmes, industrial master's and doctoral programmes, regional mobility, competitive career paths, specialist-return programmes and education funding linked to employment and firm performance.

The architecture responds by imposing discipline on industrial policy. It requires initial diagnostics, preliminary feasibility filters, multistage competitive selection, piloting, private co-financing, KPIs, transparent tax and financial incentives, automatic programme termination conditions, independent evaluation, regular publication of results and rapid withdrawal of ineffective measures.

This is the fundamental distinction between pragmatic and ideological industrial policy. The question is not whether the economy should be centrally directed, but which instruments reduce genuine barriers to private investment, preserve competition, ensure fiscal sustainability and accelerate structural transformation ([Fernandes and Reed, 2026](#); [Deléchat et al., 2024](#)).

An Architecture for Industrial Growth

The proposed architecture of industrial transformation in developing economies retains industry as the central focus of structural transformation. Its core is a phased transition from a basic production foundation to an industrial platform and then to a more sophisticated, innovation-intensive industrial system.

Physical and soft infrastructure are cross-cutting conditions for industrial growth, rather than substitutes for it. Contemporary trends — digitalisation, advanced materials, resource efficiency, environmental performance, industrial AI and selected emerging technology niches — are integrated as enabling elements needed primarily to raise industrial productivity, quality and technological sophistication.

At Stage III, these elements can become independent growth activities, but only on the previously established industrial platform. The combination of industrial focus, sequencing, market validation, private investment, infrastructure, institutional safeguards and careful integration of new technologies makes the architecture both realistic and contemporary.

The architecture thus defines market-compatible structural transformation in which the private sector invests, competes, exports and bears entrepreneurial risk, while public institutions provide rules, infrastructure, standards, project preparation and risk-sharing mechanisms where individual firms cannot remove systemic barriers themselves.

A large industrial robotic arm is positioned over a conveyor belt in a factory setting. The arm is white and blue, with a complex mechanical structure at the end. The conveyor belt is filled with electronic components, likely circuit boards, which are being processed by the robot. The background shows a large industrial facility with high ceilings and structural beams. The entire image has a blue color overlay.

4.

APPLYING THE ARCHITECTURE
OF INDUSTRIAL TRANSFORMATION
TO THE EURASIAN REGION:
INDUSTRIAL UPGRADING,
COOPERATION AND PROJECT
FEASIBILITY

This section translates the architecture into a regional framework and shows how initial diagnostics, sequencing, an opportunity portfolio, infrastructure alignment, institutional safeguards and financial feasibility shape the Eurasian region's trajectory of industrial upgrading.

Industry remains the core of transformation: deeper processing, platform industries, suppliers, expanding intermediate and higher-value-added production, reduced dependence on critical imports and sustainable exports. This is a system of conditions enabling firms, investors, financial institutions, research and education centres, and the public sector to reduce coordination costs, build project chains and pass market tests, rather than an administrative process.

The region's starting position is internally heterogeneous. Eurasia has a large industrial sector, substantial resources and energy, engineering capabilities and a sizeable combined market, yet retains commodity-oriented exports in some areas, insufficient processing depth and dependence on imported machinery, equipment, pharmaceuticals, speciality chemicals, and electronic and electrical components. The EDB study estimates the potential of four principal high-value-added industrial complexes at over US\$510 billion in additional annual output at 2019 prices; this scenario indicator is not a forecast and does not automatically cover the entire expanded portfolio of sectoral modules.

The four previously identified sectors do not fully capture intersectoral linkages. While retaining the industrial core, the regional application therefore includes related platform activities and a limited range of new niches that deepen processing, cooperation and technological resilience. They extend and strengthen the industrial base, rather than replacing it.

The architecture connects the industrial core with cross-cutting physical and soft infrastructure. Regional physical infrastructure includes industrial sites, reliable energy networks, logistics corridors, warehouses, border and port facilities, water supply, utility connections, cold chains and digital connectivity. It reduces the cost of moving raw materials, components and finished goods, provides resource access, and enables scaling up and cross-country cooperation.

Soft infrastructure — quality infrastructure, standards, certification, metrology, engineering and vocational education, applied science, development institutions, export and investment support, suppliers and project coordination — provides production compatibility, skills, engineering solutions and connections among firms in different countries and chain segments.

Without physical infrastructure, regional industrial development remains costly and fragmented; without soft infrastructure, it lacks technological coherence and reproducibility. Regional industrial policy must therefore coordinate infrastructure as well as sectors.

The Eurasian Region as an Application of the Proposed Architecture

The Eurasian region is a revealing application for three reasons. It combines resources and energy, an industrial legacy, engineering capabilities and a large market; includes countries with developed industrial bases, resources and growing demand, or niche cooperation potential; and offers cooperation opportunities needed to achieve scale in intermediate- and higher-value-added production. It therefore allows the architecture to be tested across different markets, industrial legacies and potential cooperation gains.

Infrastructure is particularly important in this regional application. EDB research on the transport network, warehousing, water and energy shows that without transport connectivity, modern warehousing, reliable energy and a water and irrigation base, many industries cannot move from priority lists to real raw materials–materials–components–equipment–finished products chains (Vinokurov et al., 2024; Vinokurov et al., 2025a; Vinokurov et al., 2025b; Vinokurov et al., 2026a).

The Eurasian Transport Network concept treats connectivity as a system of interconnected east–west and north–south corridors moving raw materials, semi-finished goods, components and finished products (Vinokurov et al., 2024). The Warehousing study shows that industrialisation, e-commerce, agribusiness and pharmaceuticals generate growing demand for modern warehouses, logistics hubs and refrigerated capacity (Vinokurov et al., 2025b).

The Risk of a Middle-Income Plateau in Eurasia: A Shared Challenge, Different Transitions

The Eurasian region combines economies at different income and industrial-maturity levels, sharing the task of changing their growth mechanism. Some must move from commodities, construction and basic investment towards deeper processing and technological infusion; others must turn an existing industrial base into a source of sustained productivity, domestic development and sophisticated exports. Income groups provide context but do not determine industrial stages: the operational unit is the country–sectoral module combination.

In Armenia, Belarus and Kazakhstan, moving from the industrial platform to the knowledge economy ($2i$ to $3i$) is most relevant to mature sectoral modules with accumulated production and engineering capabilities. Yet each economy also has activities requiring platform deepening and a transition from basic industrial foundations to an industrial platform ($1i$ to $2i$), or the removal of infrastructure and component constraints. Success should therefore be measured through productivity, product-portfolio renewal, supplier development and the ability to commercialise domestic solutions, rather than the country's income category itself.

In the Kyrgyz Republic, Tajikistan and many production modules in Uzbekistan, the dominant transition is from basic industrial foundations to an industrial platform (1i to 2i): reliable infrastructure, technical and vocational skills, standards, technological infusion, supplier development and regional market access. Uzbekistan and selected niches in the other two countries can already deepen industrial-platform elements (2i) and prepare targeted knowledge-economy functions (3i). Engineering centres, applied laboratories and technology extension programmes are therefore needed before, rather than after, basic industrialisation is complete.

The Russian Federation's high-income classification likewise does not mean its industrial transition is complete. In mature modules, the priority is the third, knowledge-economy stage (3i): domestic technologies, commercialisation and productivity diffusion through supplier networks. Segments with a high degree of component or technological dependence still require deeper industrial-platform development and technological infusion (2i). Russia's regional role is to develop sophisticated links, equipment, standards, engineering and research–production capabilities, while preserving competition and market validation.

This interpretation avoids two errors: a uniform policy package for all countries, and equating income classification with industrial stage. Regional cooperation connects modules of different maturity: developed centres provide equipment, technology, standards and engineering; growing economies provide scale, new sites and demand; and small markets participate through specialised components, services and knowledge.

Diagnosing Initial Conditions across Country Groups in the Region

The Eurasian region comprises countries with different industrial depth, market scale, technological sophistication and resource profiles. The grouping is analytical rather than hierarchical: it captures initial conditions without assigning permanent roles. It distinguishes countries with developed industrial bases, countries with substantial resources and growing demand, and economies with smaller markets and niche cooperation potential.

Industry is already the Eurasian region's largest sector by scale: in 2024 it generated around 31% of combined GDP, or US\$834 billion; manufacturing accounted for 44.2% of industrial GVA, approximately US\$368 billion. Large scale does not, however, imply sufficient technological depth. Exports in many countries remain concentrated in first-stage processed products, while second-stage products — especially machinery, equipment, pharmaceuticals, speciality chemicals and electrical components — remain important imports. The region's initial task is therefore to increase industrial sophistication and distribute production capabilities more evenly across countries, rather than build industry from scratch ([Ahunbaev et al., 2025](#)).

Countries with the most developed industrial bases: Russia and Belarus

Russia and Belarus form the region's most developed industrial core. They have relatively sophisticated manufacturing structures, strong engineering traditions, accumulated capabilities and established regional market links. Russia ranks 33rd in UNIDO's Competitive Industrial Performance Index; Belarus ranks 56th and has the region's highest manufacturing output per capita, around US\$1,470 at constant 2015 prices. Their main challenge is therefore to renew the production platform and diffuse productivity gains, rather than initiate industrialisation ([Ahunbaev et al., 2025](#)).

Russia's industry is characterised by large scale, a highly diversified production base and capabilities in machinery, metallurgy, chemicals, oil and gas processing, energy and transport equipment, pharmaceuticals, defence and nuclear industries. High import dependence nevertheless persists for several technologically complex second-stage products, including selected machinery, equipment, components, fine chemicals, pharmaceutical substances and specialised electronics. Russian industry thus combines a large domestic market and developed production structure with continuing component-based bottlenecks and gaps in selected high-technology segments.

Belarus has a smaller economy, but more export-oriented manufacturing. Its industrial structure rests on machinery, transport and agricultural equipment, chemicals, oil refining, wood processing, food production and selected electronics and electrical segments. It has the region's strongest position in intermediate- and high-value-added exports: EDB estimates put these at US\$1,489 per capita, well above regional and global median benchmarks. This reflects both historical industrial specialisation and deep integration with the Russian market.

The two countries' resource bases differ. Russia has the region's broadest natural-resource endowment: oil, gas, coal, metal ores, non-ferrous and ferrous metals, forests, agricultural resources and a substantial energy base. This provides a material foundation for processing, metallurgy, chemicals, materials and energy-intensive production. Belarus is not a major resource economy in oil and gas or mining and metallurgy. Its resource profile is primarily agricultural, wood-processing and potash-based, together with oil-refining infrastructure and industrial capabilities in machinery and chemicals. Its initial advantage therefore lies more in production capabilities, industrial specialisation and regional market access than in natural resources.

In regional trade, Russia and Belarus function both as markets and as the production core. They generate demand for second-stage processed products while supplying equipment, components and technological solutions for cross-country chains. Belarus is particularly regionally oriented; despite Russia's larger domestic market and wider trading geography, Eurasia is also an important destination for its industrial goods.

Countries with substantial resource bases and growing domestic demand: Kazakhstan and Uzbekistan

Kazakhstan and Uzbekistan share resources, growing demand and opportunities to deepen manufacturing rapidly, but their initial models differ. Kazakhstan relies more heavily on extraction, metals, oil, gas, uranium, coal and grain; Uzbekistan combines mineral, energy and agricultural resources with population scale, expanding industrial employment and a more dynamic domestic market.

Kazakhstan ranks 63rd in UNIDO's Competitive Industrial Performance Index and has manufacturing output per capita comparable to regional leaders, at around US\$1,248. Its industrial structure depends substantially on extraction, metallurgy, oil, gas, uranium, coal, grain and primary processing. Oil, metals, wheat, metal ores and other first-stage products feature prominently in exports. This provides a strong resource base, although much of its export specialisation remains concentrated in commodities and low-value-added segments.

Kazakhstan's technological structure is dual. It has a large industrial and resource base, a domestic market, and energy and logistics opportunities, yet remains highly import-dependent in second-stage products, particularly machinery, equipment, electrical goods, pharmaceuticals and selected chemicals. Economic scale and resources create preconditions for deeper industrial processing and a more sophisticated component structure ([Ahunbaev et al., 2025](#)).

Uzbekistan is in a different position. It ranks 83rd in UNIDO's Competitive Industrial Performance Index, but is significantly expanding industrial potential: manufacturing reached a record 20.2% of GDP in 2024. This indicates a more dynamic industrial-growth phase, although intermediate and high-value-added exports per capita remain well below Russia, Belarus and Kazakhstan. Its industry rests on textiles, chemicals, pulp and paper, food processing, metallurgy and selected machinery and electrical segments.

Uzbekistan's resource profile includes natural gas, gold, copper, uranium, cotton, agricultural resources, mineral raw materials and a large labour force. Unlike Kazakhstan's dominant mineral and oil-and-gas base, Uzbekistan's starting position is more closely linked to agriculture, textile traditions, a growing domestic market, energy resources and expanding industrial employment. It can therefore be viewed as an economy with an emerging industrial platform, where manufacturing already contributes significantly to GDP, as well as a resource economy.

Both countries retain substantial shares of first-stage products in external trade, but have scope to expand more sophisticated goods. The regional market plays a practical role: a significant proportion of their second-stage products is sold within Eurasia, providing initial demand for deeper processing, supplier development and subsequent entry into external markets ([Ahunbaev et al., 2025](#)).

Economies with smaller domestic markets and strong niche cooperation potential: Armenia, the Kyrgyz Republic and Tajikistan

Armenia, the Kyrgyz Republic and Tajikistan share smaller domestic markets and narrower production bases, but are not homogeneous. Armenia has greater economic complexity and selected second-stage niches; the Kyrgyz Republic has open, cooperation-oriented specialisation and labour-intensive segments; Tajikistan has a narrow industrial structure alongside significant hydropower, water and mineral resources. Regional demand and infrastructure access are especially important for all three.

Armenia ranks 89th in UNIDO's Competitive Industrial Performance Index, but belongs to the group of regional countries whose Economic Complexity Index positions have improved in recent years. Its exports include metal ores, fish, beverages, selected second-stage products and goods partly oriented towards the regional market. Intermediate and high-value-added exports approach the global median, at around US\$253 per capita. This distinguishes Armenia from other regional economies with smaller markets and indicates specific production and trade niches, although the overall industrial base remains limited ([Ahunbaev et al., 2025](#)).

Armenia's resources include metal ores, selected minerals, agricultural products, water and hydropower opportunities, and human capital in several engineering and technology fields. It lacks a large oil-and-gas or metallurgical base. Its starting position is therefore defined primarily by a limited domestic market, selected resource assets, export niches and capabilities that can participate in regional chains.

The Kyrgyz Republic ranks 115th in UNIDO's Competitive Industrial Performance Index. The size of its manufacturing sector is limited, and intermediate and high-value-added exports are around US\$30 per capita, well below the global median. Metals and metal ores, gold, selected food industries, light industry and agriculture are important specialisations. Trade is concentrated in a narrow range of goods, but the regional market is highly significant: more than 85% of second-stage product exports go to Eurasia, making regional demand an important condition for more sophisticated industrial development ([Ahunbaev et al., 2025](#)).

The Kyrgyz Republic's natural resources include gold, metal ores, hydropower potential, water, an agricultural base and pastureland. Its small domestic market, concentration on selected commodity and agricultural products, and relatively limited technological base constrain deeper industrial development. Initial conditions therefore combine resource niches, labour-intensive production, hydropower potential and a strong reliance on regional trade.

Tajikistan ranks 121st in UNIDO's Competitive Industrial Performance Index. It also lies outside the top 100 economies in the Economic Complexity Index, reflecting, among other factors, agriculture's large share and a narrow export structure. Intermediate and high-value-added exports are around US\$6 per capita, indicating limited

participation in sophisticated industrial trade. Metal ores, electricity, chemicals, light-industry products and agricultural goods are important specialisations (Ahunbaev et al., 2025).

Tajikistan's resource base includes hydropower potential, water, metal ores, aluminium and related energy-intensive industrial capacity, cotton and agricultural resources. Its industrial structure and domestic market remain narrow. This makes the country sensitive to energy, transport, water and border infrastructure and to opportunities for joining the wider regional market. Current diagnostics should therefore treat Tajikistan as an economy with limited industrial depth, but selected resource and energy assets relevant to identifying realistic industrial niches.

Armenia, the Kyrgyz Republic and Tajikistan cannot build a complete industrial platform solely within national markets. A realistic strategy must rest on a limited set of niches, regional sales and participation in broader production systems. Their foundations differ: Armenia combines minerals and selected technological capabilities; the Kyrgyz Republic combines gold, hydropower, agriculture and light industry; Tajikistan combines hydropower, water, metal ores, aluminium and agriculture. These differences shape module portfolios rather than a permanent country hierarchy.

In the World Bank's 1i–2i–3i terms, the country groups merely indicate the predominant transition. In the region's most industrially developed countries, most mature modules should advance towards the knowledge economy and domestic innovation (3i), while some segments require deeper industrial-platform development and technological infusion (2i). Economies with substantial resources and expanding domestic demand are simultaneously building industrial platforms and strengthening infusion (2i), with selected preconditions already in place for the knowledge economy and domestic innovation (3i). Economies with smaller markets and strong niche cooperation potential predominantly move from an industrial base towards an industrial platform with stronger technological infusion (1i to 2i), through quality infrastructure, skills, supplier specialisation and regional-platform access; knowledge-economy and domestic-innovation elements (3i) are feasible in a few validated niches. A specific stage is therefore assigned to the module, not the entire country.

↓ Table 4.1. Eurasian country groups by initial conditions and role in regional industrialisation

Country group	Countries	Initial conditions	Role in regional industrialisation	Key sectoral priorities	Physical infrastructure	Soft infrastructure and institutions
Countries with the most developed industrial bases	Russia, Belarus	Developed manufacturing, engineering traditions and intermediate and high value-added capabilities; capacity to serve as the region's technological and production anchor.	Anchor of the Eurasian industrial platform: sophisticated equipment, components, standards, engineering, technology support and selected R&D.	Full-cycle machinery manufacturing; transport components; energy, mining and metallurgy, oil and gas, and agricultural equipment; chemicals and petrochemicals; high-value-added metallurgy; pharmaceuticals and medical devices; electrical engineering; instruments; industrial automation and software; advanced materials; selected nuclear technologies.	Specialised industrial sites; testing, assembly and experimental production capacity; energy and transport nodes; logistics hubs and modern warehouses; industrial digital connectivity; transport-corridor access.	Advanced quality infrastructure; engineering schools; applied competence centres; sectoral project offices; supplier-system development; export certification; equipment-modernisation mechanisms; R&D and technology consortia.
Countries with substantial resource bases and growing domestic demand: Kazakhstan and Uzbekistan	Kazakhstan, Uzbekistan	Substantial resources and energy, growing domestic demand, and potential for higher-value-added production and rapid development of a medium-technology industrial platform.	Locations for Stage II platform industries; linking raw materials, energy, domestic demand and regional raw materials–materials–components–equipment chains.	Petrochemicals; polymers; fertilisers and agrochemicals; intermediate chemicals; deeper non-ferrous and ferrous metal processing; cables, transformers and electrical equipment; pumps, compressors and pipes; equipment for mining, energy, agribusiness, food and chemical processing; pharmaceuticals; packaging; technical textiles; selected critical and advanced materials.	Industrial sites and clusters; transport corridors; specialised logistics; warehousing; energy, grids and water supply; utility connections; industrial digital connectivity; infrastructure for agricultural and irrigation projects.	Standards and certification; applied engineering and vocational training; technology localisation centres; investment support; supplier-system development; export certification; project finance; financing windows for cooperative projects.

Economies with smaller domestic markets and strong niche cooperation potential	Armenia, the Kyrgyz Republic, Tajikistan	Limited domestic markets and narrower industrial bases; selected capabilities and resources for niche production and participation in regional chains.	Suppliers, component manufacturers and niche participants in regional chains; specialisation in a narrow range of activities with verified demand and technological relatedness.	Pharmaceutical and medical niches; electronics and components; electrical assembly; cable harnesses; light industry and technical textiles; food processing; packaging; energy-intensive and critical materials; selected metal products; component and service roles.	Selected industrial zones; border and logistics infrastructure; cold chains; reliable energy; basic digital connectivity; access nodes to regional corridors and warehouses.	Access to regional standards and certification; applied vocational training; export support; customs and regulatory compatibility; supplier databases; cooperative financing windows; project preparation for niche production.
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Source: compiled by EDB experts using the methodology in [Section 3](#), the priority sectoral module heatmap, [Ahunbaev et al. \(2025\)](#), [Fernandes and Reed \(2026\)](#), [Deléchat et al. \(2024\)](#), and EDB analyses of the transport network, warehousing, water, energy and MDB cooperation.

Applying the New Priority-Selection Methodology to the Region

Applying [Section 3's](#) five preliminary filters — market scale, critical production resources, technological and product relatedness, infrastructure readiness, and institutional and financial feasibility — expands the initial four priorities previously identified through a modified product-space approach: machinery, chemicals, metallurgy and food processing ([Ahunbaev et al., 2025](#)). The final heatmap in [Appendix 1](#) covers only activities that passed this preliminary screening.

Box 5. Higher-value-added production as a source of growth: the Eurasian region

The EDB's quantitative assessment covers four interconnected complexes — chemicals, machinery manufacturing, metallurgy and food processing — and identifies scenario potential of over US\$510 billion in additional annual output at 2019 prices ([Ahunbaev et al., 2025](#)). Around US\$71 billion comes from export growth, US\$81 billion from replacing some imports, and US\$361 billion from indirect and induced effects in related industries. The indicator is not a forecast and is not equivalent to an increase in GDP or GVA.

Around 70% of the aggregate estimate arises from output expansion in connected sectors: electricity, trade, transport, agriculture, chemicals and metallurgy. The estimated multiplier is US\$1.2–1.3 for each US\$1 of initial growth. This highlights the systemic nature of higher-value-added production: it creates demand for suppliers, infrastructure, services and employment, not only new export goods.

Full scenario implementation could raise individual countries' GVA by 6–13% and output by approximately 6–17%; the aggregate estimate of additional employment is around 11.8 million people. Machinery manufacturing's GVA share could rise, for example, from 4.7% to 6.6% in Belarus, from 1.0% to 2.3% in Kazakhstan and from 2.3% to 3.4% in Russia. Around 85% of the aggregate estimate accrues to Russia because of the size of its market and production base. The US\$510 billion must therefore not be interpreted as evenly distributed across countries or as the net effect of regional cooperation alone.

The Eurasian case shows that higher-value-added production can simultaneously expand exports, reduce dependence on critical imports and strengthen related industries, provided it rests on several interconnected platforms and project-level validation. The expanded heatmap does not recalculate the US\$510 billion estimate; it is a separate strategic selection tool for a broader set of modules.

Platform industries

The first core is industrial machinery manufacturing. It is a systemic priority because it combines import-substitution effects, strong product relatedness to existing capabilities, dense intersectoral linkages and high cooperation potential. Machinery links metallurgy, chemicals, electrical engineering, transport, energy, agribusiness and mining. The operational portfolio should include equipment for mining, metallurgy, energy, chemicals, food processing, agribusiness, irrigation, logistics and rail transport, as well as industrial repair and equipment modernisation.

The second core is the chemical complex, petrochemicals and polymers. It draws on the resource and energy bases of Russia, Kazakhstan, Uzbekistan and Belarus, offers strong export and import-substitution potential, and links to packaging, agrochemicals, pharmaceuticals, construction materials, plastics, machinery and advanced materials. It should be understood broadly: polymers, basic and intermediate chemicals, industrial gases, paints and coatings, chemicals for mining and construction, speciality reagents, pharmaceutical chemicals and intermediate chemical inputs for other industries.

The third core is transport components and transport equipment manufacturing. Its high priority reflects Russia's and Belarus's industrial legacies, growing component-localisation needs, demand for rail, automotive, agricultural and special-purpose equipment, and opportunities to distribute roles across countries. Regional strategy should emphasise components, assemblies, systems, repair, modernisation and servicing rather than focus narrowly on final assembly.

The fourth core is metallurgy and metalworking. This platform connects resources, metallurgy, machinery, electrical engineering, construction and transport. Priorities should shift from basic metals towards speciality steels, pipes, rolled products for machinery, metal structures, cable feedstock, non-ferrous metal products, parts and semi-finished goods.

The fifth core is fertilisers, agrochemicals and industrial chemicals. This module connects natural resources, gas, minerals, agriculture, food processing and exports. It is important not only as a chemical industry but as part of the regional agro-industrial platform.

The sixth core is food processing and advanced agro-processing. It combines employment, domestic demand, food-system resilience, export potential and linkages with packaging, chemicals, cold-chain logistics, equipment and agriculture. The region should develop not only basic processing, but also ingredients, concentrates, oils and fats, and advanced processing of grain, milk, meat, fruit and vegetables.

Related platform activities

A key related activity is electrical equipment and cables. It builds on metallurgy, non-ferrous metals, chemical materials and machinery, while demand comes from energy, transport, industry, construction and utility infrastructure. The portfolio includes cables, transformers, distribution equipment, electric motors, drive systems, power electronics and components.

The second activity is agricultural and irrigation equipment. It is particularly important for countries with developed agribusiness and shortages of modern equipment for agriculture, water management, processing and storage. In Eurasia, it connects food security, machinery, agriculture, water and regional technology needs. The EDB–UNIDO study on industrialising the water sector reinforces its importance ([Vinokurov et al., 2025a](#)).

The third activity is industrial repair, servicing and engineering. This is a substantive industrial activity rather than a secondary service. It extends equipment life cycles, localises capabilities, develops supplier networks, reduces dependence on external servicing and builds engineering expertise. These functions are directly relevant to regional countries with large stocks of operating productive assets.

The fourth activity is pharmaceuticals, pharmaceutical substances and medical devices. It combines critical-supply resilience, quality of life, demanding regulation and technological upgrading potential. It should extend beyond finished dosage forms: the portfolio can include selected substances, packaging, consumables, laboratory and diagnostic equipment, basic medical equipment and contract-manufacturing niches.

The fifth activity is packaging, pulp and paper, and polymer films. It may not always appear to be a high-technology priority, but its systemic role is substantial: packaging serves food, pharmaceuticals, chemicals, consumer goods and export-oriented industries. It can be an independent niche for small countries and part of the chemical–agro-industrial platform for larger ones.

The sixth activity is construction materials, glass and construction chemicals. A selective priority, it is important in Stages I–II because it supports industrial sites, infrastructure and the domestic investment cycle.

Selected new industrial niches

New industries should enter the strategy selectively, preparing for Stage III without diluting the industrial core. The most relevant regional activities are critical and advanced materials, energy equipment, industrial automation and software, electronics and components, nuclear technologies, equipment for environmental and resource-efficiency solutions, and bioindustries.

Critical and advanced materials are highly promising because of natural resources, metallurgy, chemicals and demand for more technology-intensive processing. Their development should follow specific chains: speciality alloys, functional polymers, composites and materials for energy, electrical engineering, transport and industrial equipment.

Automation and industrial software should be treated as a cross-cutting production module. Their purpose is to raise productivity and quality, ensure traceability, improve equipment maintenance and strengthen supply-chain management. This activity is especially important for Russia, Armenia, Belarus, Kazakhstan and Uzbekistan, but should be introduced in every country at a level appropriate to its development stage.

Energy equipment, renewable-energy components and clean technologies should develop where an industrial base exists in metallurgy, electrical engineering, machinery, materials and chemicals. Their potential lies in producing equipment, assemblies, components, materials and systems for energy efficiency, resource conservation, water treatment, waste processing and selected clean-energy chains, rather than a declarative green transition. EDB research on Central Asian energy reinforces this conclusion: rising electricity demand and the need for large-scale renewal of generation and grids create industrial demand for equipment, components, services and energy-efficient solutions ([Vinokurov et al., 2026a](#)).

Nuclear technologies have strong regional potential through Russia and selected resource–energy linkages, but are a strictly selective strategic niche. They cannot be a general priority for every country and should remain concentrated where capabilities and institutional foundations are proven.

Bioindustries and biopharmaceuticals are long-term technology options ([Vinokurov et al., 2026b](#)). They can develop through pharmaceuticals, food biotechnology, medical and laboratory segments, but only with regulation, skills, quality infrastructure and pilot production in place. Mazzucato’s mission-oriented approach supports their inclusion in the strategic horizon without removing the requirements for a production base and selection discipline ([Mazzucato, 2018](#)).

Country specialisation within the expanded regional portfolio

The expanded portfolio of promising Eurasian sectoral activities should not be implemented as an identical package for all countries. Its practical purpose is complementary country specialisation: each group develops links in the regional industrial system where its production base, resource advantages, product relatedness, market scale, and infrastructure and financial feasibility intersect. This is especially important given the substantial differences in industrial competitiveness, processing depth and the role of regional markets.

Russia and Belarus are positioned to perform the roles associated with the region's most developed industrial bases and sophisticated technological capabilities. Russia has the broadest profile: industrial machinery, transport components, chemicals and polymers, metallurgy and metalworking, energy equipment, nuclear technologies, critical materials, industrial services, automation and industrial software. Belarus's most relevant activities are machinery, agricultural and irrigation equipment, transport components, industrial services and engineering, chemicals and polymers, food processing, fertilisers and agrochemicals, electrical equipment and cables. The contribution of this group of countries should therefore extend beyond finished products to sophisticated components, equipment, standards, engineering solutions, servicing, testing, certification and workforce development for regional chains. Russia and Belarus can develop and support the most sophisticated links in materials–components–equipment–finished products chains.

Kazakhstan and Uzbekistan combine substantial resources, growing domestic demand and potential for intermediate-value-added production. Their opportunities lie in turning raw materials, energy, agriculture and demand into more sophisticated industrial activities. Kazakhstan has strong positions in chemicals and polymers, metallurgy and metalworking, critical materials, industrial machinery, fertilisers and agrochemicals, electrical equipment and cables, industrial services, advanced materials and energy equipment. This defines an upgrading trajectory through deeper resource processing: from oil, gas, metals, uranium, coal and grain towards petrochemicals, polymers, fertilisers, speciality chemicals, higher-value-added metallurgy, cables, transformers, pumps, compressors, pipes, metal structures and equipment for mining, energy, transport, logistics and agribusiness. Uzbekistan has a more diversified profile: chemicals and polymers, industrial machinery, food processing and agro-processing, transport components, agricultural and irrigation machinery, fertilisers and agrochemicals, technical textiles, electrical engineering, pharmaceuticals and metallurgy. Its specialisation can connect agribusiness, textiles, chemicals, machinery, electrical engineering, pharmaceuticals and packaging. While Kazakhstan can use minerals and energy to develop materials, chemicals, metallurgy and equipment, Uzbekistan has the foundations for a more labour-, market- and agro-industry-oriented platform.

Armenia, the Kyrgyz Republic and Tajikistan can develop niche and cooperative positions in regional production chains. Their key constraint is a small domestic market, making participation in selected regional links with verified demand, product relatedness and quality-infrastructure access more realistic than complete national industrial platforms. For Armenia, our analysis identifies pharmaceuticals and medical devices, electronics and components, food processing, automation and industrial software, electrical equipment, cables and selected metal products, consistent with its relatively more technology-oriented niche trajectory. For the Kyrgyz Republic, the most realistic activities are technical textiles, food processing, packaging, cable harnesses, simple electrical assembly, selected machinery components and basic medical manufacturing. Tajikistan's specialisation may be the most selective:

energy-intensive materials, aluminium and related metalworking, textile processing, agro-processing, construction materials, packaging and selected critical materials. These build on hydropower, water, metal ores, aluminium and agriculture, but depend on regional demand, certification, logistics and cooperative financing.

Country specialisation can be expressed as “different capabilities, one industrial system”. Russia and Belarus can develop sophisticated industrial and technology links. Kazakhstan and Uzbekistan can convert resources, energy and agriculture into intermediate-value-added platforms. Armenia, the Kyrgyz Republic and Tajikistan can strengthen regional supply chains through niche production, components and services where regional demand offsets small domestic markets. This configuration avoids both identical sectoral strategies across countries and the confinement of smaller-market economies to commodities and low-value-added production.

A Phased Roadmap for the Region

Each production module in the roadmap must include four packages: (1) skills and workforce renewal; (2) technology absorption and engineering support; (3) quality infrastructure and testing; and (4) financing for piloting and scaling up. Without all four, a project should be treated as a sectoral initiative rather than a complete project for advancing to the next industrial-maturity stage.

Stage I KPIs are supplemented by production reliability, labour productivity, dual-training coverage and adoption of basic quality systems. Stage II adds TFP growth, certified supplier numbers, the share of firms adopting new processes, products new to the firm and localisation of engineering capabilities. Stage III adds private R&D, revenue from new products, commercialised developments, and exports of sophisticated products, licences and engineering services.

Stage I: Laying the foundations and removing systemic bottlenecks

For Eurasia, the first stage does not mean every country starting from scratch. It means reducing basic constraints and creating a minimally compatible production environment for regional industrial development. The focus is launching and expanding activities that most rapidly create production resilience, employment, reduced dependence on critical imports and initial supplier chains: primarily agro-processing, fertilisers and agrochemicals, basic and intermediate chemicals, primary and secondary metal processing, industrial construction materials, packaging, basic metal products, equipment repair and modernisation, and, in selected countries, deeper textile and food processing.

For Russia and Belarus, the first stage primarily involves removing critical constraints (*bottlenecks*) in existing production: expanding the production of key components,

upgrading technological units, and developing supplier networks and quality infrastructure. For Kazakhstan and Uzbekistan, the main priorities are launching and expanding capacity for deeper raw materials processing, as well as producing basic materials, agrochemicals, metal products, construction materials, packaging and equipment to meet domestic industrial demand. For Armenia, the Kyrgyz Republic and Tajikistan, priorities include developing niche industrial sites, improving logistics, ensuring access to certification and workforce training, and developing production activities that can integrate into regional value chains, including agro-processing, textiles, selected components and packaging. At this stage, digital solutions play a supporting role and include basic automation, accounting systems, quality control, digital support for logistics processes and supply traceability.

Physical infrastructure — energy, transport, industrial sites, logistics and warehouses, water supply, utility networks and basic digital connectivity — has direct industrial significance at this stage because it determines costs and production reliability. Soft infrastructure — standards, certification, workforce development, project-support agencies, investor one-stop shops, export and investment mechanisms, including initial long-term financing for shared productive resources — is equally important, since firms otherwise cannot move from isolated production to durable chains.

An operational regional strategy must connect infrastructure with specific industrial growth. These public inputs are the most widely applicable first-choice instruments for countries with differing administrative capabilities ([Fernandes and Reed, 2026](#)). The Eurasian Transport Network provides the physical foundation for moving raw materials, semi-finished goods, components and finished products; warehousing supports reliable supply and export readiness; and Central Asia's water-energy system creates opportunities for agro-processing, irrigation equipment, energy-intensive materials and industrial sites ([Vinokurov et al., 2024](#); [Vinokurov et al., 2025a](#); [Vinokurov et al., 2025b](#)).

Stage II: Building the Eurasian industrial platform

The second stage can become the centrepiece of regional industrial strategy. It moves from individual production activities to interconnected platforms: chemicals and technology, machinery, metallurgy, agro-industry, electrical engineering, pharmaceuticals, and services and engineering.

The chemical and technology platform includes deeper hydrocarbon and mineral processing, polymers, fertilisers, agrochemicals, intermediate chemicals, mining and construction chemicals, packaging materials, speciality reagents and pharmaceutical chemicals. The machinery platform covers equipment for mining, energy, transport, agribusiness, chemical and food processing, rail equipment, pumps, compressors, valves and fittings, machine tools, components and services. The metallurgical

platform includes speciality steels, rolled products, pipes, metal structures, cable feedstock and parts; the agro-industrial platform includes advanced processing of grain, oils, milk, meat, fruit and vegetables, packaging, refrigeration and equipment; the electrical platform includes cables, transformers, drives, motors, distribution equipment and power electronics; and the pharmaceutical platform includes finished dosage forms, selected substances, packaging, consumables and medical devices.

Stage II physical infrastructure should become more specialised: clusters, industrial hubs, testing capacity, series-production sites, container and warehouse logistics, energy capacity for medium-technology industries and industrial digital systems. Soft infrastructure also becomes more sophisticated: engineering education, sectoral competence centres, supplier-system development, export certification, more advanced quality infrastructure, project offices, long-term credit and project finance. Without these, industries may grow quantitatively without becoming a resilient industrial system.

At this stage, transport, warehousing, energy and water must be closely linked to specific sectoral platforms. The transport network reduces cross-country material and component supply costs. Warehousing improves supply reliability and export readiness. Energy modernisation creates demand for electrical equipment, cables, transformers, energy equipment and services. Water creates industrial niches for irrigation machinery, pumps, pipes, filtration systems, water-use automation and servicing. These are conditions for the industrial platform to function.

Digitalisation and newer technologies become more important while remaining embedded in industrial logic. Digital systems move beyond basic records towards industrial automation, ERP/MES connectivity, predictive maintenance, industrial Internet of Things applications and data-driven quality and supply management. Advanced materials and more complex chemicals develop mainly as extensions of metallurgical and chemical platforms. Environmental and resource-efficiency solutions should improve productivity and market access, rather than replacing industrial strategy. Stage II thus primarily expands the industrial core without dissolving it into an overly broad technology agenda.

Country specialisations within these platforms should be complementary. Russia and Belarus can develop the most sophisticated segments: engineering-intensive production, standards and R&D. Kazakhstan and Uzbekistan can be key locations for deeper raw materials processing, intermediate and advanced production, and equipment for substantial domestic and regional demand. Armenia, the Kyrgyz Republic and Tajikistan can focus on selected production niches, assembly, components and integration into shared cooperative chains.

Stage III: A joint transition to the knowledge economy

The regional third stage should be selective. It does not assume that every country simultaneously develops the same high-technology industries. Its purpose is to build a limited range of more complex activities on the established platform, either raising basic industries' technology intensity or opening new export opportunities.

For Russia and Belarus, the region's most industrially developed countries, promising activities include high-technology chemicals, innovative materials, industrial software and automation, instrument making, medical equipment, nuclear technologies and selected biopharmaceutical segments.

Kazakhstan and Uzbekistan may focus on advanced and critical materials, electrical engineering, industrial digital transformation, machinery-intensive niches in energy, transport and agribusiness, and pharmaceutical chemistry. For Armenia, the Kyrgyz Republic and Tajikistan, our analysis points to narrower cooperative activities: components, packaging, selected medical and electrical instruments, medical devices, technical textiles, materials and digital services, subject to verified markets and product relatedness.

Promising niches in resource efficiency, energy storage, water treatment, waste processing and clean-energy value chains can develop on the previously established industrial platform.

Physical infrastructure now becomes a research–production base: pilot lines, testing centres, laboratories, shared-use facilities and advanced data centres for computing and data management. Soft infrastructure includes advanced quality infrastructure, R&D institutions, research consortia, regulatory mechanisms for new technologies, venture and quasi-venture financing, and applied-development commercialisation. This stage is the most demanding in governance quality and fiscal space. It should therefore develop through a portfolio of pilot projects rather than immediate large-scale financing for every technologically attractive activity.

↓ Table 4.2. Portfolio of priority Eurasian industries by stage and country group

Stage/country group	Countries with the most developed industrial bases: Russia, Belarus	Countries with substantial resources and growing domestic demand: Kazakhstan, Uzbekistan	Economies with smaller domestic markets and strong niche cooperation potential: Armenia, the Kyrgyz Republic, Tajikistan	Regional effect and infrastructure logic
Stage I. Basic production foundation	Targeted modernisation of existing capacity; critical-component localisation; equipment repair and modernisation; supplier-network development; quality-infrastructure renewal; basic automation and digital record-keeping.	Higher-value-added raw materials processing; fertilisers and basic chemicals; metal products; construction materials and chemicals; packaging; agribusiness and processing equipment; basic electrical engineering; irrigation equipment linked to the water sector.	Agro-processing; textile processing; packaging; simple electrical assembly; cable harnesses; metal products; basic medical devices; energy-intensive materials and local services.	Shared production discipline; reduced basic import dependence; initial cooperative supplies. Physical infrastructure: energy, sites, transport, warehouses and water. Soft infrastructure: standards, certification, skills and project support.
Stage II. Eurasian industrial platform	Full-cycle machinery; rail equipment; energy, mining and metallurgy, and oil and gas equipment; speciality chemicals; pharmaceuticals; high-value-added metallurgy; electrical engineering; instruments; industrial engineering, services and automation.	Petrochemicals; polymers; agrochemicals; cables; transformers; pumps; compressors; pipes; metal structures; equipment for mining, energy, agribusiness, food and chemical processing; pharmaceuticals; technical fabrics; packaging and logistics.	Pharmaceutical niches and medical devices; electrical assembly; component roles; technical textiles; food processing; packaging; selected metal products; supplier and service functions for major platforms.	Raw materials–materials–components–equipment–finished products chains; expansion of intermediate-value-added production; regional market scaling. Stage II infrastructure: clusters, testing, container and warehouse logistics, engineering centres and supplier-system development.
Stage III. More sophisticated technology segments	Advanced chemicals; advanced materials; industrial AI and software; robotics and automation; instruments; medical equipment; biopharmaceuticals; nuclear technologies; clean technologies and resource-efficient solutions built on the industrial platform.	Critical and advanced materials; energy and industrial components; industrial digitalisation; energy equipment; machinery-intensive niches for energy, transport and agribusiness; selected pharmaceutical and chemical-technology segments; energy-storage and resource-efficiency components.	Highly selective niches in engineering, components, medical-technology, packaging, electrical engineering or digital-service, provided there is cooperative demand, product relatedness and regional-platform access.	Greater technological sophistication while retaining the industrial core. Requires pilot lines, testing centres, laboratories, shared-use facilities, R&D consortia, regulatory regimes and quasi-venture financing.

Source: compiled by EDB experts based on the priority sectoral module map; sectoral reference points aligned with [Ahunbaev et al. \(2025\)](#), [Vinokurov et al. \(2025a\)](#), [Fernandes and Reed \(2026\)](#), and [Deléchat et al. \(2024\)](#).

Regional Cooperation and Economies of Scale

Cooperation has a tangible industrial purpose in Eurasia. Large markets provide a starting point for many industries, while preserving competition and external openness; small and medium-sized economies gain access to larger demand, technologies, suppliers and standards. Regional industrialisation should therefore form a system of compatible, distributed value chains, rather than isolated national programmes.

Existing trade flows already demonstrate the region's importance for second-stage products. The EDB estimates that Eurasia accounts for around 59% of the sales of such products on average, with particularly high shares in individual countries: over 85% for the Kyrgyz Republic, around 70% for Belarus, 57% for Kazakhstan, 53% for Uzbekistan, 43% for Armenia and 39% for Tajikistan. The largest cooperation gains are expected in chemicals, metallurgy and machinery ([Ahunbaev et al., 2025](#)). Cooperation should extend to electrical engineering, agricultural and irrigation machinery, industrial services and engineering, packaging, pharmaceuticals, energy equipment and selected advanced-material niches. Operational strategy should treat cooperation primarily as a mechanism for building regional production chains.

Chemical chains move from hydrocarbons and minerals to basic chemicals, polymers, packaging, agrochemicals, pharmaceutical chemicals and plastic products. Metallurgical chains move from ores and metals to rolled products, semi-finished goods, pipes, cable feedstock, speciality steels, structures and parts. Machinery chains move from metals, chemicals and electrical engineering to components and then equipment for mining, agribusiness, processing, transport and energy. Agri-food chains connect agricultural raw materials with ingredients, advanced processing, packaging and cold-chain logistics; pharmaceutical and medical chains connect substances and packaging with finished dosage forms and selected medical devices; electrical chains connect non-ferrous metals and materials with cables, transformers, drives and distribution equipment. Such cooperation lowers scale thresholds for both major platforms and numerous related industries.

Infrastructure's cross-cutting role is especially clear here. Physical infrastructure for cooperation comprises corridors, border and customs facilities, dry ports, warehouses, industrial hubs, and energy and logistics connections. Soft infrastructure for cooperation comprises compatible standards, mutual recognition of certification, supplier databases, digitally interoperable logistics and customs, joint workforce programmes, technology consortia and project-support institutions. Without the former, cooperation remains costly; without the latter, quality is insufficiently reliable and scaling is difficult. Eurasian infrastructure should therefore be designed around cooperative links from the outset, as well as national needs.

Regional cooperation must not become regional autarky. Eurasia's most productive model combines internal cooperation with external openness. The regional market can provide an initial platform for launching, deepening and scaling processing,

while openness supplies technological discipline, equipment, export markets and new solutions. Fully realising export potential could substantially raise second-stage products' share of regional countries' exports: from 11% to 19% in Kazakhstan, 19% to 28% in Russia and 16% to 25% in Tajikistan, while Armenia and Belarus could potentially derive most of their export revenues from intermediate and high-value-added goods. This also fits the World Bank view: for most instruments, market size encompasses access to preferential and regional markets as well as domestic demand ([Fernandes and Reed, 2026](#)).

The Institutional and Financial Configuration for Implementation

Implementing the architecture in Eurasia requires two levels of coordination. National authorities focus on project selection and preparation, infrastructure, workforce policy, quality institutions and financial discipline. Regional coordination should cover standards, cross-border projects, supplier networks, technology platforms and financing cooperative chains.

The institutional foundation should be a partnership among business, research and educational centres, financial institutions and the public sector, operating through specific platforms: chemicals, machinery, metallurgy, agri-food, electrical engineering, pharmaceuticals, services and engineering, and infrastructure. Each needs sectoral councils, competence centres, project offices, workforce programmes, supplier-development mechanisms, export certification and regular monitoring. The main measure of institutional quality is the ability to turn promising sectoral activities into feasible projects.

The financial architecture should be multilayered, combining public, private and international capital. The first layer comprises national development institutions, development funds, national development banks and budget programmes. These should primarily finance shared-access infrastructure, industrial sites, quality infrastructure, pilot production, experimental capacity at universities and research centres, and engineering and logistics facilities. Russia's National Wealth Fund and industrial development institutions, Kazakhstan's Samruk-Kazyna and the Development Bank of Kazakhstan, and Uzbekistan's Fund for Reconstruction and Development can fulfil this role. Their mandates should be more closely linked to intermediate- and high-value-added projects. Public instruments must retain the principle of financial return: concessional loans, guarantees, equity participation and co-financing should support commercially viable projects with systemic effects.

The second layer comprises international financial institutions and multilateral development banks (MDBs). The EDB identifies faster growth in non-sovereign financing, diversification of instruments and greater private-capital participation as likely directions in the evolution of the MDB system ([Vinokurov et al., 2026c](#)). In 2008–2025,

they provided US\$71 billion in non-sovereign financing to Eurasian economies, including US\$17 billion, or 24%, for industry (EDB, 2026). Their contribution includes long-term capital, project expertise, technical assistance, guarantees, environmental and social assessment, and risk reduction for private investors. A shared portfolio of industrial–infrastructure chains could be a regional priority: transport nodes, industrial parks, logistics hubs, energy, water infrastructure, irrigation equipment, warehouses, production clusters and supplier networks. MDBs can combine sovereign and non-sovereign financing, project-preparation grants, guarantees, political and currency risk insurance, and blended finance.

The third layer comprises the EDB and Eurasian industrial-cooperation instruments. The EDB is important for regional industrial development through project development, long-term financing and feasibility appraisal. The EAEU mechanism for financing cooperative industrial projects, which reduces borrowing costs for joint production, is particularly significant. In 2008–2025, the EDB provided US\$6.6 billion in non-sovereign industrial investment in Eurasia, or 38.1% of the IFIs' cumulative industrial portfolio in the region (EDB, 2026). This instrument should be developed in capitalisation, sectoral coverage and accessibility for smaller-market economies. An industrial learning and innovation fund could be promising, co-financing R&D, pilot lines, experimental production, technology absorption, cooperative chains, deployment, interfirm technology diffusion and commercialisation.

The fourth layer is public–private partnership. In Eurasian industrial development, PPPs can support industrial parks, technopolises, logistics hubs, testing centres, quality infrastructure, service centres and the modernisation of underutilised industrial assets. Cross-border projects may include fertilisers, irrigation equipment, agricultural processing, industrial logistics and components. They require clear legal frameworks, risk allocation, long-term offtake contracts and transparent commitments by the parties (Vinokurov et al., 2023).

The fifth layer comprises export credit agencies and export–import banks. They can reduce financing and insurance barriers to sophisticated industrial exports: machinery, electrical and agricultural equipment, medical devices, food-industry equipment, components and materials. Such exports require buyer credit, commercial and political risk insurance, guarantees and transaction support. National agencies — EXIAR and Rosximbank in Russia, KazakhExport in Kazakhstan, and export institutions in Uzbekistan and elsewhere — should focus on promising industrial activities. Large deliveries to third countries could use a Eurasian mechanism for joint export-risk insurance.

The sixth layer is foreign direct investment and joint ventures, which bring technologies, management practices, market access and integration into production chains. Investor attraction should use prepared proposals covering sites, infrastructure, markets, local partners, financing, cooperation, workforce training, supplier development and exports. Petrochemicals, electrical engineering, pharmaceuticals, medical devices, industrial equipment, packaging and advanced materials are particularly

promising. From 2016 through the first half of 2025, mutual FDI stock in the region reached US\$48.4 billion, of which manufacturing accounted for US\$9 billion, or 18.4% (Vinokurov et al., 2025c).

The seventh layer comprises domestic private investment, commercial banks and capital markets. Regional industry needs long-term resources in national currencies. Accelerated depreciation, investment tax credits, R&D deductions, guarantees, co-financing and corporate bond market development can mobilise them. Commercial banks can participate through credit lines from development banks and international institutions. This is particularly important for industrial SMEs: large funds and development banks do not always work with them directly, although they account for many suppliers and service firms.

The eighth layer is green, climate and Islamic finance. These instruments suit projects where environmental or resource-efficiency benefits align with industrial logic. Green bonds, climate funds and specialised credit lines can finance energy efficiency, clean energy, water treatment, waste processing, electric transport, low-carbon metallurgy, and chemical and water-sector modernisation. Islamic finance can widen the pool of long-term investors for Central Asia and projects involving Gulf capital (Ayazbayev et al., 2025).

Project offices at national and regional levels should coordinate funding sources by building an industrial project pipeline. Each project should specify capital cost estimates, financing sources, available risk-sharing, co-financing or infrastructure-support instruments, expected export gains and reductions in dependence on critical imports, infrastructure needs, environmental requirements, risks and repayment periods. This makes projects understandable to national development institutions, MDBs, commercial banks, export credit agencies and private investors.

Moving from strategy to investment requires dedicated project-preparation resources. For example, infrastructure project preparation under the Global Infrastructure Facility (GIF) — feasibility studies, design, environmental and social assessments, structuring and project agreements — typically costs around 2–10% of total project value, averaging approximately 3% (Lu, 2020). Without this stage, sectoral priorities rarely become bankable project portfolios. Preparation can have a high multiplier effect: for each US\$1 spent on project preparation, GIF mobilised more than US\$100 in net private capital at financial close (Manroth, 2024). For development banks, this confirms the value of project offices, early structuring and portfolio preparation aimed at industrial chains.

Financing stages should follow the architecture. First-stage resources go to industrial sites, logistics, energy, quality infrastructure, vocational training, basic digital systems and project preparation. Second-stage priorities are platform industries: chemicals, machinery, metallurgy, electrical engineering, agro-processing, pharmaceuticals and industrial services. They require long-term loans, project finance, PPPs, export

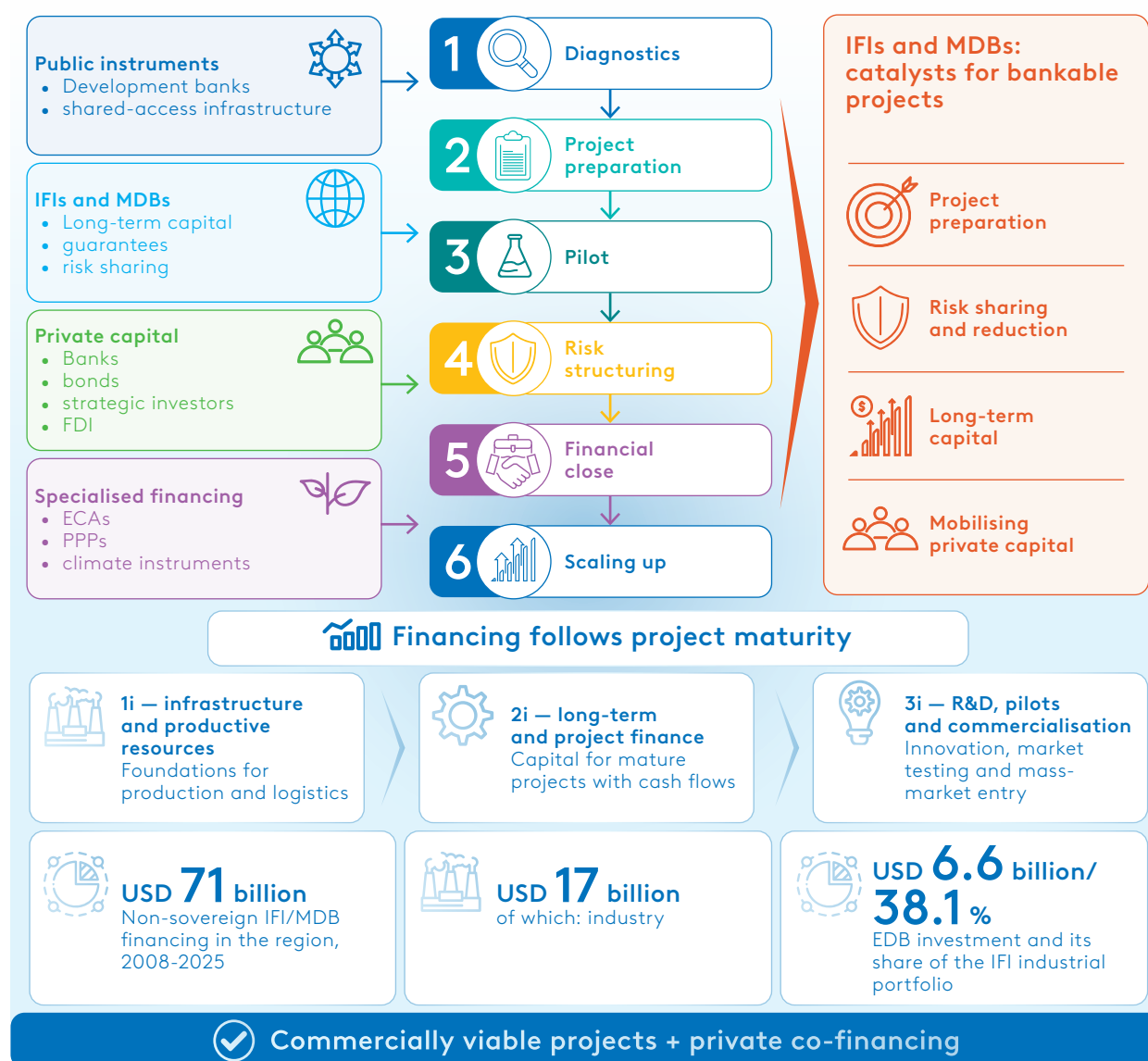
finance and supplier networks. The third stage adds R&D funds, pilot lines, technology platforms, venture and quasi-venture instruments, mission-oriented programmes, and green and climate finance.

Instrument selection must account for market size, governance quality and fiscal space. Where capacity is limited, industrial parks, skills, market access and quality infrastructure take priority. Production and innovation incentives, competitive procurement, local supplier-development requirements and demand stimulation require stronger governance, markets and budgets (Fernandes and Reed, 2026). Macroeconomic stability, transparency, competition and evaluation of expenditure effectiveness remain essential for diversification and industrial growth (Deléchat et al., 2024).

↓ **Figure 6. The financial architecture of industrial transformation: capital sources, project preparation and risk allocation**

From strategy to a bankable project

How the financial architecture turns priorities into investment



Source: EDB (2026).

Eurasian Industrialisation: A Realistic Portfolio, Country-level Coordination, Integrated Infrastructure and a Multilayered Financial Architecture

Regional development should rest on an expanded but realistic portfolio. The core comprises chemicals, machinery, high-value-added metallurgy and food processing, complemented by electrical engineering, agricultural and irrigation machinery, repair and engineering, pharmaceuticals and medical devices, packaging, industrial construction materials, critical materials, energy equipment and limited technology niches.

Our main conclusion is that Eurasia's industrial strategy must be differentiated by country, but regionally coherent. Russia and Belarus can develop the most sophisticated industrial and technology links. Kazakhstan and Uzbekistan can use resources, energy, agriculture and growing domestic demand to build platform industries and deeper processing. Armenia, the Kyrgyz Republic and Tajikistan can strengthen regional chains through niche and cooperative segments: pharmaceuticals, electronics, technical textiles, packaging, agro-processing, materials and components.

Physical and soft infrastructure should form an integrated framework across the strategy. At the first stage, they establish basic production reliability and reproducibility; at the second, they turn a collection of industries into an industrial platform; at the third, they enable entry into new technology segments. This phased, infrastructure-aligned modernisation brings natural resources, industrial legacies, engineering capabilities, the regional market and technological openness into one strategy.

The financial configuration should be a network of blended finance. Public and multilateral instruments reduce initial risks and support preparation, infrastructure and risk sharing; private capital scales viable projects; export agencies reduce entry barriers; development banks provide long horizons and expertise; and capital markets broaden domestic funding. This enables a high-value-added industrial system without administrative substitution for market validation.

↓ Table 4.3. Phased roadmap for Eurasian industrialisation: stages, modules, instruments and financing sources

Stage	Production focus	Physical infrastructure	Soft infrastructure and institutions
Stage I. Laying foundations and removing structural constraints	Basic processing and raw materials processing; fertilisers and agrochemicals; packaging; construction materials; food and textile processing; equipment repair and servicing; initial component roles; niche production sites.	Energy supply; industrial sites; transport and warehouse connectivity; water supply; cold chains; basic digital connectivity; border and customs infrastructure for initial cooperative supplies.	Basic quality infrastructure; standards and certification; vocational training; investor one-stop shops; export services; project preparation; initial supplier databases; basic M&E.
Stage II. Building the Eurasian industrial platform	Chemical and technology, machinery, metallurgical, agro-industrial, electrical, pharmaceutical, and services and engineering platforms; component base; intermediate-value-added production; exports and import substitution in the industrial core.	Clusters and industrial hubs; testing and series-production capacity; container, warehouse and refrigerated logistics; energy capacity for medium-technology production; transport corridors; industrial information systems and connectivity; irrigation and energy-equipment infrastructure.	Engineering education; sectoral competence centres; supplier-system development; export certification; advanced quality infrastructure; project offices; cross-country standards; mutual certificate recognition; digital interoperability of logistics and customs.
Stage III. Moving into more sophisticated technology segments	Advanced chemicals; advanced and critical materials; industrial automation and software; instruments; medical equipment; bioindustries; selected nuclear technologies; energy equipment, clean technologies and resource-efficiency solutions based on the industrial platform.	Pilot lines; testing centres; laboratories; shared-use facilities; research-production sites; computing capacity and industrial data infrastructure; specialised energy and digital infrastructure for experimental production.	R&D institutions; technology consortia; IP protection and commercialisation; regulatory regimes for new technologies; advanced quality infrastructure; sectoral missions with limited portfolios; international scientific and technological cooperation; independent evaluation.

Source: compiled by EDB experts based on Section 3, Appendix 1, Fernandes and Reed (2026), Deléchat et al. (2024), Ahunbaev et al. (2025), Vinokurov et al. (2024; 2025a; 2025b; 2026a) and Vinokurov et al. (2026).

Policy instruments	Financing sources and the role of MDBs	KPIs and transition conditions
Shared productive resources; industrial parks and SEZs without excessive tax losses; skills development; market-access assistance; procedural simplification; cooperative pilot projects; targeted localisation programmes for critical production inputs.	Budget and quasi-budget programmes; national development banks; EDB; PPPs for sites, logistics, energy and water; MDB technical assistance; grant-funded project preparation; initial guarantees for cooperative supplies.	Operational industrial sites; fewer infrastructure bottlenecks; initial certified producers; greater localisation in basic segments; emerging suppliers and cooperative contracts; readiness for Stage II scaling.
Supplier-development programmes; project support; targeted credit lines; production and innovation incentives only with adequate governance; competitive procurement with performance requirements; technological cooperation; export promotion.	Long-term industrial credit; project finance; EDB and national development banks; supplier-network co-financing; export credit and insurance; blended finance; MDB guarantees; private capital and strategic FDI with agreed supplier-development and learning programmes.	A larger share of intermediate-value-added products; durable supplier networks; expanded mutual component trade; growing exports and reduced dependence on critical imports; better certified quality; a project portfolio for Stage III.
Instruments may include competitive innovation grants and procurement to test demonstration solutions where demand is verified. Incentives must be temporary, tied to stringent KPIs, private co-financing and <i>sunset clauses</i> , so that only viable projects retain support.	R&D funds; technology platforms; quasi-venture funds; MDBs organising blended finance, guarantees, project expertise, local-currency financing and joint cross-border projects; private-capital mobilisation through risk sharing.	Successful pilot projects with verified demand; commercialised developments; exports of engineering, component and technological solutions; stronger R&D links between business and science; no permanent subsidy dependence; transition from pilot projects to scalable niches.

CONCLUSION

Our analysis shows that **industrial transformation in developing economies requires a coordinated architecture** connecting initial diagnostics, the production base, human capital, technology absorption, infrastructure, institutions and financing, rather than fragmented sectoral measures. Its purpose is to turn the broad objective of industrial upgrading into a sequence of market-tested decisions and viable projects. The report's main conclusions are the following interrelated propositions:

Industrial transformation changes the growth mechanism. For many developing countries, it means more than increasing output. Once the advantages of cheap labour, resource rents, simple capital accumulation and straightforward technology adoption have been exhausted, sustained progress towards high-income status requires turning investment into production capabilities, external technologies into domestic technological mastery, and accumulated capabilities into domestic innovation. Industry performs this function by connecting scale, productivity, learning, suppliers, standards, engineering skills and external tests of competitiveness.

Domestic industry does not mean autarky. It does not imply producing everything within the country. Its defining feature is an economy's ability to select, absorb, adapt and improve technologies, develop suppliers, ensure quality, repair and servicing, design processes and gradually create new products. Openness, FDI and participation in global value chains yield long-term results only when they increase domestic value added, competence depth and production resilience.

There is no single industrial development trajectory. A country's income category does not determine the maturity of all its activities: basic industries, platform production and selected innovation niches may coexist. The operational policy unit should therefore be the country–sectoral module combination, with priorities based on verified demand, market scale, resources and capabilities, product relatedness, infrastructure readiness, and institutional and financial feasibility rather than technological fashion.

Industrial policy requires market discipline. Market-compatible policy clearly separates roles: the private sector invests, competes, bears entrepreneurial risk and validates new niches; public institutions provide shared productive resources unavailable to individual firms — physical and soft infrastructure, standards, skills, project preparation and risk-sharing mechanisms. Subsidies, incentives and protective measures are permissible only selectively, for a limited period, with private co-financing, measurable indicators and readiness to withdraw support if no results are achieved.

Three systems must develop together. The industrial base accumulates production and engineering capabilities; human capital turns external knowledge into acquired capabilities; and the innovation system converts capabilities into new products

and processes. Equipment without skills does not become productive knowledge, education without firm demand does not yield sustained returns, and innovation without a production platform does not scale. Digitalisation, industrial AI, advanced materials, biotechnology and environmentally efficient solutions should primarily improve productivity, quality, traceability and resource efficiency in existing and emerging production, rather than replace the industrial base.

The route depends on the country's starting position. Resource-based economies must convert rents into infrastructure, processing, engineering capabilities and supplier networks; small economies must offset limited domestic markets through regional cooperation, compatible standards and exports; and countries with more developed industrial platforms must move from operation and assembly to design, applied R&D and commercialisation. The regional level provides shared suppliers, certification, industrial sites, investment and cross-border production chains. The Eurasian application shows how resources, accumulated capabilities and a common market can become higher-value-added chains and projects ready for financing.

The bottleneck is viable projects. Every priority must become a project with verified demand and financial feasibility, aligning infrastructure, skills, standards, suppliers, technologies, markets and risk allocation. Development banks and multilateral financial institutions are not only capital providers, but also builders of trust: they organise preparation, appraisal, blended finance, guarantees, local-currency instruments and cross-border coordination ([Vinokurov et al., 2026](#)).

Success is measured by outcomes, not incentives. Industrial transformation advances when productivity and domestic value added rise, durable suppliers emerge, job quality improves, new processes are absorbed, products new to firms and markets expand, and dependence on critical imports falls. This avoids two extremes: premature commitments to technologically attractive but unprepared projects, and entrenching commodity, assembly or low-value-added specialisation through permanent protection and subsidies.

Together, these conclusions define the architecture's practical purpose. It helps developing countries align industrial ambition with initial capabilities, select attainable upgrading opportunities and advance them from pilot to scale. For Eurasia, this means moving from fragmented national production towards a complementary system of higher-value-added activities grounded in a common market, compatible standards and cross-border projects. When the industrial base, human capital, innovation system, infrastructure and financing function together, investment and external technologies become higher productivity, domestic value added and quality employment — the foundations for attaining and sustaining high-income status.

The EDB report's novelty is an operational architecture for decisions. Its contribution is to connect elements usually considered separately. Historical lessons, industrial policy theories and feasibility requirements are integrated into one

sequence: diagnostics–selection–piloting–scaling up–financing– evaluation– adjustment or withdrawal of ineffective measures. It is neither a list of “correct” industries nor a new general theory of industrialisation, but a navigation tool that translates strategic ambitions into a realistic portfolio of industrial opportunities and prepared projects. The approach rests on a pragmatic synthesis: markets select solutions, public institutions remove systemic barriers, and support depends on measurable results.

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ABBREVIATIONS

AI	artificial intelligence
CHIPS	Creating Helpful Incentives to Produce Semiconductors; acronym in the title of the CHIPS and Science Act
GDP	gross domestic product
GNI	gross national income
GVA	gross value added
EAEU	Eurasian Economic Union
ECAs	export credit agencies
EDB	Eurasian Development Bank
ERP	Enterprise Resource Planning
EXIAR	Russian Agency for Export Credit and Investment Insurance
FDI	foreign direct investment
GIF	Global Infrastructure Facility
HS6	six-digit level of the Harmonized Commodity Description and Coding System (Harmonized System)
IFIs	international financial institutions
IMF	International Monetary Fund
IP	intellectual property
ISO	International Organization for Standardization
ITU	International Telecommunication Union
JEL	Journal of Economic Literature classification system
KPI	key performance indicators
MDBs	multilateral development banks
M&E	monitoring and evaluation
MES	Manufacturing Execution System
OECD	Organisation for Economic Co-operation and Development
OEM	original equipment manufacturer
PPP	public-private partnership
R&D	research and development
SEZ	special economic zone
SMEs	small and medium-sized enterprises
TFP	total factor productivity
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
UN-OHRLLS	United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
USA	United States of America
USSR	Union of Soviet Socialist Republics
WIPO	World Intellectual Property Organization
WITS	World Integrated Trade Solution; the World Bank's integrated international trade database
1i	investment
2i	investment + infusion
3i	investment + infusion + innovation

APPENDIX 1.

Priority Heatmap: Scoring Priority Sectoral Modules in the Eurasian Region

The appendix provides strategic screening of sectoral modules that have already passed the filters in [Section 3](#). It does not cover every possible industry or replace market, technological and project appraisal. A high regional score indicates a module's potential within the regional portfolio, not that it is a near-term priority for every country.

Methodological framework and scale

The assessment uses the eight criteria in [Section 3](#). K6 draws on the modified product-space concept, sectoral specialisation, import dependence and lists of second-stage niche industries analysed in an EDB report ([Ahunbaev et al., 2025](#)). Evidence is prioritised as follows: comparable statistics and EDB calculations; official sectoral and strategic data; and expert judgement where consistent indicators are unavailable.

Each criterion is scored from 1 to 5, with intermediate values permitted: 1 — critical preconditions are largely absent; 2 — the base is fragmented and constraints are severe; 3 — potential is partial and requires substantial complementary investment; 4 — the base is strong and implementation is feasible with targeted measures and project validation; 5 — mature anchor capabilities, verified markets and scaling potential exist. The country score is $S = 0.15K1 + 0.15K2 + 0.15K3 + 0.10K4 + 0.15K5 + 0.10K6 + 0.10K7 + 0.10K8$.

↓ Table A1. Assessment criteria

Code	Criterion	Assessment scope	Weight
K1	Resource, energy and capability base	availability of resources, energy, skills, operating firms and engineering capacity	15%
K2	Market potential and demand scale	sufficient domestic, regional and export markets to achieve scale	15%
K3	Multiplier effect and intersectoral linkages	strength of links with suppliers, services, transport, energy, agribusiness and science	15%
K4	Supply-chain resilience and reduced dependence on critical imports	contribution to critical-supply resilience, reduced technological vulnerability and lower dependence on external supplies in economically justified segments	10%
K5	Export competitiveness	export specialisation, competitive niches and external demand potential	15%
K6	Product-space alignment and technological relatedness	alignment with product relatedness, identified specialisation and niche products	10%
K7	Cooperation potential	ability to form cross-country chains and lower scale thresholds	10%
K8	Infrastructure and financial feasibility	availability of physical and soft infrastructure, institutions, financing and implementation capacity	10%

↓ Table A2. Colour scale

4.60–5.00 Systemic priority	4.30–4.59 High priority	4.00–4.29 Selective priority	3.70–3.99 Pilot/cooperation priority	< 3.70 Long-term option/not a near-term priority
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The colour scale applies only to modules passing preliminary screening; activities failing critical filters are not shown. Scores support comparative prioritisation and are not forecasts of profitability, financing amounts or substitutes for feasibility studies.

Summary priority map for the Eurasian region

The regional score combines anchor capability and the breadth of potential: $R = 0.45 \times \max(S_i) + 0.35 \times \text{avg}(\text{top-3 } S_i) + 0.20 \times \text{avg}(S_i)$, where S_i denotes the seven country scores. The formula assigns greater weight to the anchor country and the three strongest participants, while accounting for the average breadth of regional potential. The regional score therefore indicates the potential to build a distributed chain, rather than equal module priority in every country.

↓ Table A3. Regional potential and country scores

Code	Sectoral module	Type	Stage	Region	ARM	BLR	KAZ	KGZ	RUS	TJK	UZB
S01	Food/agro	core/basic platform	I–II	4.57	4.43	4.62	4.29	4.29	4.53	4.13	4.62
S02	Chemicals/polymers	core platform	II	4.78	3.94	4.71	4.87	3.91	4.91	3.90	4.71
S03	Fertilisers/agrochemicals	core/related platform	I–II	4.65	3.77	4.58	4.62	3.73	4.80	3.92	4.55
S04	Pharma/medical devices	related platform/new niche	II–III	4.61	4.49	4.39	3.93	4.06	4.79	3.52	4.50
S05	Metallurgy/metalworking	core platform	II	4.72	4.21	4.36	4.84	3.84	4.88	4.27	4.40
S06	Critical materials	resource platform/new niche	II–III	4.65	4.00	3.82	4.83	3.73	4.83	4.15	4.30
S07	Industrial machinery	core platform	II	4.83	4.18	4.93	4.67	4.06	4.97	3.70	4.71
S08	Transport components	core/related platform	II	4.76	3.85	4.83	4.36	3.97	4.94	3.44	4.61
S09	Agric./irrigation equipment	related platform	I–II	4.70	3.92	4.84	4.33	3.92	4.83	3.65	4.58
S10	Electrical equipment/cables	related platform	II	4.66	4.33	4.57	4.59	4.24	4.79	3.85	4.50
S11	Repair/services/engineering	related platform	I–II	4.68	4.19	4.78	4.51	3.98	4.81	3.76	4.34
S12	Packaging	related platform	I–II	4.30	4.14	4.33	4.14	4.06	4.34	3.79	4.30
S13	Construction materials/chemicals	basic/related platform	I	4.25	3.91	4.12	4.31	4.00	4.23	4.01	4.24
S14	Light industry/technical textiles	basic/niche platform	I–II	4.44	3.83	4.45	3.54	4.40	3.90	4.21	4.55
S15	Automation/software	cross-cutting digital module	II–III	4.54	4.40	4.42	3.94	3.42	4.77	3.17	4.18
S16	Electronics/components	new industrial niche	II–III	4.46	4.47	4.35	3.92	3.63	4.62	3.17	4.23
S17	Advanced materials	new industrial niche	III	4.54	4.06	4.15	4.47	3.63	4.77	4.05	4.13
S18	Eco-efficient equipment	new industrial niche	III	4.28	3.80	4.02	4.15	3.74	4.46	3.79	3.99
S19	Energy equipment/renewables	related/new niche	II–III	4.64	3.87	4.44	4.42	3.94	4.87	3.83	4.33
S20	Bioindustries	new industrial niche	III	4.22	4.08	4.00	3.62	3.62	4.42	3.25	3.96
S21	Nuclear technologies	selective strategic niche	III	4.45	3.04	3.85	4.42	2.68	4.89	2.48	3.58
S22	Wood/furniture/biomaterials	basic/related platform	I–II	4.19	3.56	4.38	3.58	3.70	4.08	3.33	4.04

Source: EDB expert assessment based on the methodology in [Section 3](#), the modified product space and EDB sectoral assessments ([Ahunbaev et al., 2025](#)); feasibility criteria aligned with [Fernandes and Reed \(2026\)](#) and [Deléchat et al. \(2024\)](#). Scores are rounded to two decimal places; investment decisions must supplement regional scores with country scores, technological-learning profiles and project validation.

Priority map: Armenia

Group in the regional architecture of industrial transformation: niche and cooperation nodes.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A4. Detailed criterion heatmap: Armenia

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S04	Pharma/medical devices	4.7	4.4	4.4	4.6	4.5	4.7	4.4	4.2	4.49	II–III
S16	Electronics/components	4.6	4.3	4.6	4.7	4.4	4.6	4.4	4.2	4.47	II–III
S01	Food/agro	4.6	4.4	4.4	4.2	4.4	4.6	4.4	4.4	4.43	I–II
S15	Automation/software	4.5	4.2	4.5	4.5	4.4	4.5	4.5	4.1	4.40	II–III
S10	Electrical equipment/cables	4.2	4.2	4.4	4.4	4.3	4.5	4.6	4.2	4.33	II
S05	Metallurgy/metalworking	4.3	3.9	4.4	4.3	4.1	4.3	4.4	4.1	4.21	II
S11	Repair/services/engineering	4.1	4.0	4.4	4.2	4.1	4.1	4.6	4.1	4.19	I–II
S07	Industrial machinery	4.0	3.9	4.5	4.4	4.0	4.2	4.6	4.0	4.18	II
S12	Packaging	4.1	4.0	4.2	4.0	4.1	4.3	4.4	4.1	4.14	I–II
S20	Bioindustries	4.1	4.0	4.1	4.3	4.1	4.1	4.1	3.9	4.08	III
S17	Advanced materials	4.0	3.9	4.3	4.3	4.0	4.0	4.2	3.8	4.06	III
S06	Critical materials	3.9	3.8	4.2	4.3	3.9	3.9	4.2	3.9	4.00	II–III
S02	Chemicals/polymers	3.8	3.6	4.3	4.2	3.8	3.8	4.3	3.8	3.94	II
S09	Agric./irrigation equipment	3.8	3.6	4.3	4.1	3.8	3.8	4.3	3.8	3.92	I–II
S13	Construction materials/chemicals	3.9	3.8	4.0	3.8	3.9	3.9	4.1	3.9	3.91	I
S19	Energy equipment/renewables	3.8	3.6	4.2	4.3	3.8	3.5	4.2	3.6	3.87	II–III
S08	Transport components	3.6	3.5	4.3	4.2	3.7	3.6	4.4	3.6	3.85	II
S14	Light industry/technical textiles	3.8	3.7	3.9	3.8	3.8	3.8	4.1	3.8	3.83	I–II
S18	Eco-efficient equipment	3.8	3.6	4.0	4.2	3.8	3.5	4.0	3.5	3.80	III
S03	Fertilisers/agrochemicals	3.6	3.5	4.1	4.0	3.7	3.6	4.1	3.6	3.77	I–II
S22	Wood/furniture/biomaterials	3.5	3.4	3.7	3.6	3.5	3.5	3.8	3.5	3.56	I–II
S21	Nuclear technologies	2.8	2.5	3.8	3.9	2.8	2.5	3.6	2.6	3.04	III

Key systemic/strong modules: S04 (Pharma/medical devices), S16 (Electronics/components), S01 (Food/agro), S15 (Automation/software), S10 (Electrical equipment/cables), S05 (Metallurgy/metalworking).

Priority map: Belarus

Group in the regional architecture of industrial transformation: industrial core.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A5. Detailed criterion heatmap: Belarus

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S07	Industrial machinery	5.0	4.9	4.9	4.8	5.0	5.0	5.0	4.8	4.93	II
S09	Agric./irrigation equipment	5.0	4.9	4.7	4.6	4.9	5.0	4.7	4.9	4.84	I–II
S08	Transport components	4.9	4.8	4.7	4.7	4.9	4.9	4.9	4.8	4.83	II
S11	Repair/services/engineering	4.9	4.8	4.6	4.5	4.8	4.9	4.9	4.8	4.78	I–II
S02	Chemicals/polymers	4.8	4.7	4.7	4.5	4.8	4.8	4.7	4.6	4.71	II
S01	Food/agro	4.8	4.7	4.5	4.3	4.7	4.8	4.5	4.6	4.62	I–II
S03	Fertilisers/agrochemicals	4.7	4.6	4.5	4.4	4.6	4.7	4.5	4.6	4.58	I–II
S10	Electrical equipment/cables	4.5	4.6	4.5	4.5	4.6	4.7	4.7	4.5	4.57	II
S14	Light industry/technical textiles	4.6	4.5	4.2	4.1	4.6	4.6	4.4	4.5	4.45	I–II
S19	Energy equipment/renewables	4.3	4.5	4.5	4.6	4.4	4.3	4.5	4.5	4.44	II–III
S15	Automation/software	4.3	4.4	4.5	4.5	4.4	4.3	4.5	4.5	4.42	II–III
S04	Pharma/medical devices	4.3	4.4	4.3	4.6	4.5	4.3	4.3	4.5	4.39	II–III
S22	Wood/furniture/biomaterials	4.6	4.5	4.1	4.0	4.5	4.6	4.2	4.5	4.38	I–II
S05	Metallurgy/metalworking	4.2	4.4	4.5	4.3	4.4	4.2	4.5	4.3	4.36	II
S16	Electronics/components	4.2	4.3	4.5	4.6	4.3	4.2	4.4	4.4	4.35	II–III
S12	Packaging	4.3	4.4	4.2	4.1	4.4	4.3	4.5	4.4	4.33	I–II
S17	Advanced materials	4.0	4.1	4.3	4.3	4.1	4.0	4.3	4.2	4.15	III
S13	Construction materials/ chemicals	4.1	4.2	4.1	3.9	4.2	4.1	4.1	4.2	4.12	I
S18	Eco-efficient equipment	3.9	4.0	4.1	4.2	4.0	3.9	4.1	4.0	4.02	III
S20	Bioindustries	3.9	4.0	4.0	4.2	4.0	3.9	4.0	4.0	4.00	III
S21	Nuclear technologies	3.6	3.7	4.2	4.3	3.8	3.6	3.9	3.8	3.85	III
S06	Critical materials	3.6	3.7	4.0	4.2	3.8	3.6	4.0	3.7	3.82	II–III

Key systemic/strong modules: S07 (Industrial machinery), S09 (Agric./irrigation equipment), S08 (Transport components), S11 (Repair/services/engineering), S02 (Chemicals/polymers), S01 (Food/agro).

Priority map: Kazakhstan

Group in the regional architecture of industrial transformation: transformation economies with resources and scale.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A6. Detailed criterion heatmap: Kazakhstan

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S02	Chemicals/polymers	5.0	5.0	4.8	4.6	4.9	5.0	4.7	4.8	4.87	II
S05	Metallurgy/metalworking	5.0	5.0	4.7	4.6	4.9	5.0	4.6	4.8	4.84	II
S06	Critical materials	5.0	5.0	4.6	4.7	4.9	5.0	4.5	4.8	4.83	II–III
S07	Industrial machinery	4.5	4.8	4.8	4.7	4.6	4.7	4.8	4.5	4.67	II
S03	Fertilisers/agrochemicals	4.8	4.8	4.5	4.4	4.6	4.8	4.4	4.6	4.62	I–II
S10	Electrical equipment/cables	4.7	4.7	4.5	4.5	4.5	4.7	4.6	4.5	4.59	II
S11	Repair/services/engineering	4.4	4.6	4.5	4.3	4.5	4.6	4.7	4.5	4.51	I–II
S17	Advanced materials	4.4	4.6	4.5	4.5	4.5	4.4	4.3	4.5	4.47	III
S19	Energy equipment/renewables	4.5	4.5	4.4	4.6	4.3	4.5	4.3	4.3	4.42	II–III
S21	Nuclear technologies	4.5	4.4	4.5	4.6	4.4	4.5	4.1	4.3	4.42	III
S08	Transport components	4.2	4.4	4.5	4.5	4.3	4.2	4.6	4.2	4.36	II
S09	Agric./irrigation equipment	4.2	4.4	4.5	4.3	4.3	4.2	4.4	4.3	4.33	I–II
S13	Construction materials/chemicals	4.5	4.5	4.2	4.0	4.3	4.5	4.1	4.3	4.31	I
S01	Food/agro	4.2	4.5	4.3	4.2	4.3	4.2	4.2	4.3	4.29	I–II
S18	Eco-efficient equipment	4.1	4.2	4.2	4.3	4.1	4.1	4.1	4.1	4.15	III
S12	Packaging	4.1	4.2	4.2	4.0	4.1	4.1	4.3	4.1	4.14	I–II
S15	Automation/software	3.8	3.9	4.2	4.2	3.8	3.8	4.1	3.8	3.94	II–III
S04	Pharma/medical devices	3.8	3.9	4.1	4.3	3.8	3.8	4.0	3.8	3.93	II–III
S16	Electronics/components	3.7	3.9	4.2	4.4	3.8	3.6	4.0	3.8	3.92	II–III
S20	Bioindustries	3.5	3.6	3.8	4.0	3.5	3.4	3.7	3.5	3.62	III
S22	Wood/furniture/biomaterials	3.5	3.6	3.7	3.6	3.5	3.5	3.7	3.5	3.58	I–II
S14	Light industry/technical textiles	3.4	3.5	3.7	3.6	3.5	3.4	3.8	3.4	3.54	I–II

Key systemic/strong modules: S02 (Chemicals/polymers), S05 (Metallurgy/metalworking), S06 (Critical materials), S07 (Industrial machinery), S03 (Fertilisers/agrochemicals), S10 (Electrical equipment/cables).

Priority map: Kyrgyz Republic

Group in the regional architecture of industrial transformation: niche and cooperation nodes.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A7. Detailed criterion heatmap: Kyrgyz Republic

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S14	Light industry/technical textiles	4.7	4.2	4.2	4.1	4.5	4.7	4.4	4.4	4.40	I–II
S01	Food/agro	4.5	4.1	4.3	4.2	4.2	4.5	4.3	4.2	4.29	I–II
S10	Electrical equipment/cables	4.3	4.0	4.4	4.4	4.1	4.3	4.5	4.0	4.24	II
S12	Packaging	4.2	3.8	4.1	3.9	4.0	4.2	4.4	4.0	4.06	I–II
S07	Industrial machinery	3.9	3.6	4.5	4.4	3.9	3.9	4.6	3.9	4.06	II
S04	Pharma/medical devices	4.0	3.8	4.2	4.4	4.0	4.2	4.2	3.8	4.06	II–III
S13	Construction materials/chemicals	4.0	3.8	4.1	3.9	4.0	4.2	4.1	4.0	4.00	I
S11	Repair/services/engineering	3.9	3.6	4.3	4.1	3.9	3.9	4.5	3.8	3.98	I–II
S08	Transport components	3.8	3.5	4.3	4.3	3.8	4.0	4.5	3.8	3.97	II
S19	Energy equipment/renewables	3.9	3.6	4.3	4.4	3.9	3.6	4.3	3.6	3.94	II–III
S09	Agric./irrigation equipment	3.8	3.6	4.3	4.1	3.8	3.8	4.3	3.8	3.92	I–II
S02	Chemicals/polymers	3.8	3.5	4.3	4.2	3.8	3.8	4.3	3.7	3.91	II
S05	Metallurgy/metalworking	3.7	3.5	4.2	4.1	3.7	3.7	4.2	3.7	3.84	II
S18	Eco-efficient equipment	3.7	3.5	4.0	4.1	3.7	3.4	4.0	3.5	3.74	III
S06	Critical materials	3.6	3.4	4.0	4.2	3.6	3.6	4.0	3.6	3.73	II–III
S03	Fertilisers/agrochemicals	3.6	3.4	4.1	4.0	3.6	3.6	4.1	3.6	3.73	I–II
S22	Wood/furniture/biomaterials	3.7	3.5	3.8	3.6	3.7	3.7	3.9	3.7	3.70	I–II
S16	Electronics/components	3.5	3.3	4.2	4.3	3.4	3.2	4.0	3.2	3.63	II–III
S17	Advanced materials	3.5	3.3	4.1	4.1	3.5	3.2	4.1	3.3	3.63	III
S20	Bioindustries	3.6	3.4	3.9	4.0	3.5	3.3	3.9	3.4	3.62	III
S15	Automation/software	3.3	3.1	4.0	4.0	3.1	3.0	4.0	3.0	3.42	II–III
S21	Nuclear technologies	2.4	2.0	3.7	3.7	2.2	2.1	3.4	2.1	2.68	III

Key systemic/strong modules: S14 (Light industry/technical textiles), S01 (Food/agro), S10 (Electrical equipment/cables), S12 (Packaging), S07 (Industrial machinery), S04 (Pharma/medical devices).

Priority map: Russia

Group in the regional architecture of industrial transformation: industrial core.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A8. Detailed criterion heatmap: Russia

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S07	Industrial machinery	5.0	5.0	5.0	4.8	5.0	5.0	4.9	5.0	4.97	II
S08	Transport components	5.0	5.0	4.8	4.8	5.0	5.0	4.9	5.0	4.94	II
S02	Chemicals/polymers	5.0	5.0	4.8	4.7	5.0	5.0	4.7	5.0	4.91	II
S21	Nuclear technologies	5.0	5.0	4.8	4.8	5.0	5.0	4.4	5.0	4.89	III
S05	Metallurgy/metalworking	5.0	5.0	4.7	4.6	5.0	5.0	4.6	5.0	4.88	II
S19	Energy equipment/renewables	5.0	5.0	4.7	4.8	4.8	5.0	4.6	5.0	4.87	II–III
S09	Agric./irrigation equipment	5.0	5.0	4.7	4.6	4.8	5.0	4.6	4.9	4.83	I–II
S06	Critical materials	5.0	5.0	4.6	4.7	4.9	5.0	4.4	4.9	4.83	II–III
S11	Repair/services/engineering	4.8	5.0	4.7	4.5	4.8	5.0	4.8	4.9	4.81	I–II
S03	Fertilisers/agrochemicals	5.0	5.0	4.6	4.5	4.8	5.0	4.5	4.9	4.80	I–II
S10	Electrical equipment/cables	4.9	5.0	4.6	4.6	4.8	4.9	4.7	4.8	4.79	II
S04	Pharma/medical devices	4.9	5.0	4.5	4.8	4.8	4.9	4.4	5.0	4.79	II–III
S17	Advanced materials	4.9	4.9	4.6	4.6	4.8	4.9	4.5	4.9	4.77	III
S15	Automation/software	4.9	4.9	4.6	4.6	4.8	4.9	4.5	4.9	4.77	II–III
S16	Electronics/components	4.7	4.7	4.6	4.7	4.5	4.7	4.4	4.7	4.62	II–III
S01	Food/agro	4.5	4.8	4.4	4.3	4.6	4.5	4.3	4.7	4.53	I–II
S18	Eco-efficient equipment	4.4	4.7	4.3	4.5	4.5	4.4	4.2	4.6	4.46	III
S20	Bioindustries	4.4	4.7	4.2	4.4	4.5	4.4	4.1	4.6	4.42	III
S12	Packaging	4.3	4.5	4.2	4.1	4.4	4.3	4.4	4.5	4.34	I–II
S13	Construction materials/chemicals	4.2	4.5	4.1	4.0	4.3	4.2	4.1	4.4	4.23	I
S22	Wood/furniture/biomaterials	4.1	4.3	3.9	3.8	4.2	4.1	3.9	4.2	4.08	I–II
S14	Light industry/technical textiles	3.8	4.0	3.9	3.8	4.0	3.8	4.0	3.9	3.90	I–II

Key systemic/strong modules: S07 (Industrial machinery), S08 (Transport components), S02 (Chemicals/polymers), S21 (Nuclear technologies), S05 (Metallurgy/metalworking), S19 (Energy equipment/renewables).

Priority map: Tajikistan

Group in the regional architecture of industrial transformation: niche and cooperation nodes.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A9. Detailed criterion heatmap: Tajikistan

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S05	Metallurgy/metalworking	4.4	3.9	4.5	4.3	4.2	4.4	4.4	4.1	4.27	II
S14	Light industry/technical textiles	4.5	4.0	4.1	4.0	4.2	4.5	4.2	4.2	4.21	I–II
S06	Critical materials	4.3	3.8	4.3	4.4	4.0	4.3	4.2	4.0	4.15	II–III
S01	Food/agro	4.3	3.9	4.3	4.1	4.0	4.3	4.2	4.0	4.13	I–II
S17	Advanced materials	4.2	3.8	4.3	4.3	4.0	3.9	4.2	3.7	4.05	III
S13	Construction materials/chemicals	4.2	3.8	4.1	3.9	4.0	4.2	4.0	3.9	4.01	I
S03	Fertilisers/agrochemicals	3.9	3.6	4.2	4.1	3.8	4.0	4.1	3.8	3.92	I–II
S02	Chemicals/polymers	3.8	3.5	4.3	4.2	3.8	3.8	4.2	3.7	3.90	II
S10	Electrical equipment/cables	3.7	3.6	4.2	4.2	3.7	3.7	4.2	3.6	3.85	II
S19	Energy equipment/renewables	3.8	3.5	4.2	4.3	3.8	3.5	4.1	3.5	3.83	II–III
S12	Packaging	3.8	3.5	4.0	3.8	3.7	3.8	4.2	3.6	3.79	I–II
S18	Eco-efficient equipment	3.8	3.5	4.0	4.2	3.8	3.5	4.0	3.5	3.79	III
S11	Repair/services/engineering	3.6	3.4	4.2	4.0	3.6	3.6	4.3	3.5	3.76	I–II
S07	Industrial machinery	3.5	3.2	4.3	4.2	3.5	3.5	4.3	3.2	3.70	II
S09	Agric./irrigation equipment	3.5	3.2	4.2	4.0	3.5	3.5	4.0	3.4	3.65	I–II
S04	Pharma/medical devices	3.4	3.1	3.9	4.2	3.4	3.4	3.8	3.1	3.52	II–III
S08	Transport components	3.2	3.0	4.1	4.0	3.2	3.2	4.1	2.9	3.44	II
S22	Wood/furniture/biomaterials	3.3	3.0	3.6	3.5	3.2	3.3	3.6	3.2	3.33	I–II
S20	Bioindustries	3.2	3.0	3.7	3.9	3.0	2.9	3.6	2.7	3.25	III
S16	Electronics/components	3.0	2.8	3.9	4.0	2.8	2.7	3.7	2.5	3.17	II–III
S15	Automation/software	3.0	2.8	3.9	3.9	2.8	2.7	3.8	2.5	3.17	II–III
S21	Nuclear technologies	2.2	1.8	3.6	3.6	2.0	1.9	3.2	1.7	2.48	III

Key systemic/strong modules: S05 (Metallurgy/metalworking), S14 (Light industry/technical textiles), S06 (Critical materials), S01 (Food/agro), S17 (Advanced materials), S13 (Construction materials/chemicals).

Priority map: Uzbekistan

Group in the regional architecture of industrial transformation: transformation economies with resources and scale.

The table scores eight criteria; the final-score colour indicates the level of priority.

↓ Table A10. Detailed criterion heatmap: Uzbekistan

Code	Sectoral module	K1	K2	K3	K4	K5	K6	K7	K8	Total	Stage
S02	Chemicals/polymers	4.8	4.8	4.7	4.5	4.7	4.8	4.7	4.6	4.71	II
S07	Industrial machinery	4.7	4.8	4.8	4.7	4.6	4.7	4.9	4.5	4.71	II
S01	Food/agro	4.8	4.8	4.5	4.3	4.6	4.8	4.5	4.6	4.62	I–II
S08	Transport components	4.6	4.7	4.6	4.6	4.5	4.6	4.8	4.5	4.61	II
S09	Agric./irrigation equipment	4.7	4.6	4.6	4.4	4.5	4.7	4.6	4.5	4.58	I–II
S03	Fertilisers/agrochemicals	4.7	4.6	4.5	4.4	4.5	4.7	4.5	4.5	4.55	I–II
S14	Light industry/technical textiles	4.8	4.7	4.2	4.1	4.7	4.8	4.4	4.6	4.55	I–II
S10	Electrical equipment/cables	4.5	4.6	4.5	4.5	4.4	4.5	4.6	4.4	4.50	II
S04	Pharma/medical devices	4.6	4.6	4.3	4.6	4.5	4.6	4.3	4.5	4.50	II–III
S05	Metallurgy/metalworking	4.2	4.5	4.5	4.3	4.4	4.5	4.5	4.3	4.40	II
S11	Repair/services/engineering	4.2	4.4	4.4	4.3	4.3	4.2	4.7	4.3	4.34	I–II
S19	Energy equipment/renewables	4.2	4.5	4.4	4.5	4.2	4.2	4.4	4.2	4.33	II–III
S06	Critical materials	4.2	4.4	4.3	4.5	4.3	4.2	4.3	4.2	4.30	II–III
S12	Packaging	4.2	4.4	4.2	4.1	4.3	4.5	4.5	4.3	4.30	I–II
S13	Construction materials/chemicals	4.2	4.4	4.2	4.0	4.3	4.2	4.2	4.3	4.24	I
S16	Electronics/components	4.1	4.2	4.4	4.5	4.1	4.2	4.3	4.1	4.23	II–III
S15	Automation/software	4.0	4.2	4.4	4.4	4.1	4.0	4.3	4.1	4.18	II–III
S17	Advanced materials	4.0	4.2	4.3	4.3	4.0	4.0	4.3	4.0	4.13	III
S22	Wood/furniture/biomaterials	4.2	4.2	3.9	3.8	4.0	4.2	4.0	4.0	4.04	I–II
S18	Eco-efficient equipment	3.9	4.0	4.1	4.2	3.9	3.9	4.1	3.9	3.99	III
S20	Bioindustries	3.9	4.0	4.0	4.2	3.9	3.8	4.0	3.9	3.96	III
S21	Nuclear technologies	3.3	3.4	4.1	4.1	3.4	3.3	3.8	3.3	3.58	III

Key systemic/strong modules: S02 (Chemicals/polymers), S07 (Industrial machinery), S01 (Food/agro), S08 (Transport components), S09 (Agric./irrigation equipment), S03 (Fertilisers/agrochemicals).

Full sectoral module names and sources

↓ Table A11. Full sectoral module names

Code	Short name	Full name
S01	Food/agro	Food processing and advanced agro-processing
S02	Chemicals/polymers	Chemical complex, petrochemicals and polymers
S03	Fertilisers/agrochemicals	Fertilisers, agrochemicals and industrial chemicals
S04	Pharma/medical devices	Pharmaceuticals, pharmaceutical substances and medical devices
S05	Metallurgy/metalworking	High-value-added metallurgy and metalworking
S06	Critical materials	Non-ferrous, critical and rare-earth materials
S07	Industrial machinery	Machinery manufacturing and industrial equipment
S08	Transport components	Transport equipment and components
S09	Agric./irrigation equipment	Agricultural and irrigation machinery
S10	Electrical equipment/cables	Electrical equipment, cables and power equipment
S11	Repair/services/ engineering	Industrial repair, servicing, engineering and equipment modernisation
S12	Packaging	Packaging, pulp and paper, and polymer films
S13	Constr. materials/chemicals	Construction materials, glass and construction chemicals
S14	Light industry/ technical textiles	Light industry and technical textiles
S15	Automation/ software	Industrial automation, instrument making and software
S16	Electronics/ components	Electronics and electronic components
S17	Advanced materials	Advanced materials and composites
S18	Eco-efficient equipment	Eco-efficient and environmental equipment
S19	Energy eqpt./renewables	Energy equipment, energy storage and renewable-energy components
S20	Bioindustries	Bioindustries and biotechnology niches
S21	Nuclear technologies	Nuclear industry and nuclear technologies
S22	Wood/furniture/ biomaterials	Wood processing, furniture and biomaterials

Sources and comments

The priority map is an expert strategic assessment used to build a portfolio. [Section 3's](#) technological-learning profile is a mandatory qualitative filter at project validation, but is not reinserted into the arithmetic score, to avoid double counting. Investment decisions require separate market studies, feasibility studies, risk analysis and confirmation of private demand.

K6 draws on the modified product space, specialisation and import-dependence analysis, and lists of second-stage niche industries in the EDB report: Ahunbaev, A., Adakhaev, A., Chuev, S., Gnidchenko, A., Salnikov, V. (2025). *Advanced Manufacturing Potential in Eurasia: Sectoral Niches for Growth*. Almaty: Eurasian Development Bank.

K8 captures the cross-cutting nature of physical and soft infrastructure: energy, transport, industrial sites, quality infrastructure, standards, skills, development institutions and access to long-term financing.

Industrial policy instrument selection is aligned with the World Bank feasibility framework: Fernandes, Ana Margarida, and Tristan Reed. 2026. *Industrial Policy for Development: Approaches in the 21st Century*. Washington, DC: World Bank.

Requirements for macroeconomic stability, human capital, infrastructure, competition and careful use of vertical measures are aligned with: Deléchat, Corinne, et al. 2024. *Economic Diversification in Developing Countries*. Washington, DC: International Monetary Fund.

New sectoral niches are included selectively within mission-oriented industrial policy: Mazzucato, Mariana. 2018. *Mission-Oriented Innovation Policies: Challenges and Opportunities*. *Industrial and Corporate Change* 27 (5): 803–15.



Research at the EDB website



Macroeconomic Outlook (RU/EN)

Macroeconomic Outlook 2026–2028

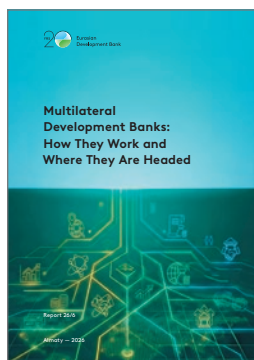
The analysis reviews economic development of the Bank's member states in early 2026 and outlines key macroeconomic forecasts for late 2026 and for 2027–2028.



Report 26/9 (RU/EN)

Transport Corridors Infrastructure: The Observatory and an Interactive Map of Eurasian Transport Network Projects — 2026

This Working paper presents the results of a review of investment in the development of transport corridors in the Eurasian region in 2025, as well as an analysis of projects under implementation or in the planning stage for the period up to 2035. The report provides an assessment of China's involvement in the development of transport infrastructure in Central Asia.



Report 26/6 (RU/EN)

Multilateral Development Banks: How They Work and Where They Are Headed

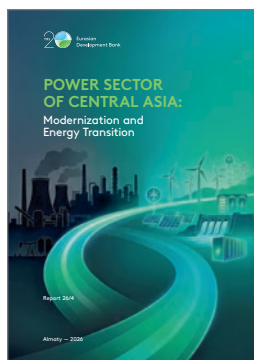
This report is the first comprehensive 'encyclopedia' of the MDB system. It examines the criteria for classifying institutions as MDBs, their formation stages, geographic scope of operations, governance structures, mandates, instruments, key performance indicators, and the system's development outlook for the next decade.



Report 26/5 (RU/EN)

Waves of Investment Megahype. Digital, ESG, AI: What's Next?

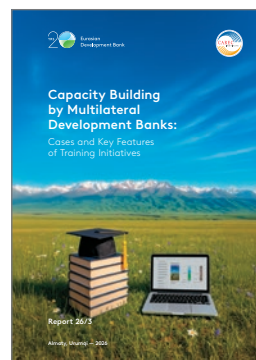
The report analyzes technological investment booms and potential new waves over a 20-year horizon: biotech, robotics, space, VR, energy storage, and climate adaptation. Special focus is placed on investments in biotech and longevity as a response to labor market challenges.



Report 26/4 (RU/EN)

Power Sector of Central Asia: Modernization and Energy Transition

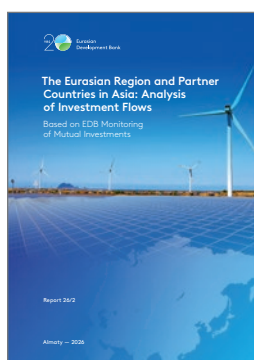
How can Central Asia secure a reliable and clean energy future? The answer lies in the «Middle Path» strategy. The report substantiates a balanced modernization model, integrating renewable energy potential with the stability of traditional generation and the synergies of regional cooperation.



Report 26/3 (RU/EN)

Capacity Building by Multilateral Development Banks: Cases and Key Features of Training Initiatives

The report provides an overview of MDBs training initiatives (academies, institutes, training programs), analyzes their goals, governance and financing models, thematic areas, and other characteristics, outlines the long-term outlook for the development of the MDB training initiatives.



Report 26/2 (RU/EN)

The Eurasian Region and Partner Countries in Asia: Analysis of Investment Flows based on EDB Monitoring of Mutual Investments

The report provides detailed information on the scale, dynamics, geographical and sectoral structure of mutual foreign direct investment stock between Asian countries and countries in the Eurasian region for the period from 2016 to the first half of 2025.



Report 26/1 (RU/EN)

Cooperation of Multilateral Development Banks in Emerging Markets and Developing Countries: Untapped Opportunities

The report examines seven promising areas for MDB cooperation: 1) mobilizing capital, 2) capital markets, 3) local currencies, 4) project expertise, 5) pooling knowledge, 6) technical assistance, 7) cross-border projects.



Report 25/15 (RU/EN)

China and the Eurasian Region: Analysis of Investment flows based on EDB Monitoring of Mutual Investments

The report provides detailed information on the scale, dynamics, geographical and sectoral structure of mutual foreign direct investment stock between China and countries in the Eurasian region for the period from 2016 to the first half of 2025.



Report 25/14 (RU/EN)

Investment Cooperation in the Eurasian Region based on EDB Monitoring of Mutual Investments

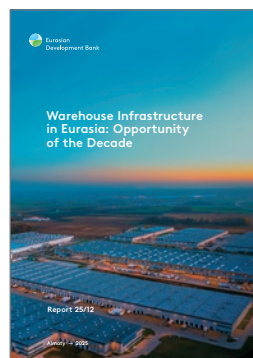
The report provides comprehensive insights into the scale, dynamics, geographical and sectoral structure of mutual foreign direct investments in the Eurasian region from 2016 to the first half of 2025, as well as key trends in investment cooperation.



Working Paper 25/13 (RU)

Arab Gulf: Macroeconomic and Financial Monitoring

The EDB's monitoring provides an analysis of the economies of six Gulf countries and assesses medium-term trends, including GDP growth, inflation, debt sustainability, and fiscal and monetary policies.



Report 25/12 (RU/EN)

Warehouse Infrastructure in Eurasia: Opportunity of the Decade

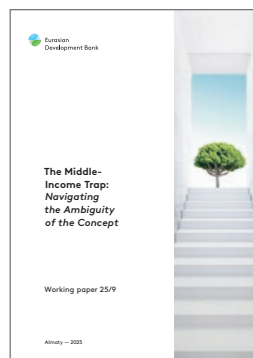
The report presents an analysis of the current state of the warehouse logistics and storage sector in the Eurasian region, examines the main factors influencing its development, and provides a detailed forecast of demand for warehouse infrastructure in the region up to 2040.



Report 25/11 (RU/EN)

Advanced Manufacturing Potential in Eurasia: Sectoral Niches for Growth

The transition to high value-added production could become a powerful driver of economic growth in the region. The study identifies priority industries and niche markets for each country, and provides estimates of export potential and import substitution potential.



Working Paper 25/9 (RU/EN)

The Middle-Income Trap: Navigating the Ambiguity of the Concept

The study shows that diversity of interpretations of the "middle-income trap" makes it difficult to understand whether an economy is in it. The paper also identifies the factors of transition to a higher income: stable macroeconomics, ability to innovate, strong institutions and demographics.



Report 25/8 (RU/EN)

Investing in the future: projects of international financial organizations in Eurasia

The report analyzes 10 fundamental trends in non-sovereign financing by international financial institutions in the Eurasian region and formulates a number of proposals for more active and diversified IFI investments in development projects.



Report (RU/EN)

Exploring Trade and Investment Relations between India and Central Asia: Unlocking Economic Benefits

This joint report focuses on a comprehensive analysis of the current state and potential for improving bilateral trade and investment relations between India and Central Asia, and provides policy recommendations for closer cooperation.



**RESEARCH DEPARTMENT
EURASIAN DEVELOPMENT BANK**

Your comments and suggestions concerning this
document are welcome at:

pressa@eabr.org



Eurasian Development Bank

www.eabr.org