Manufacturing the European Renaissance: Towards a New Industrial Policy Integrated System

Antonio Andreoni

Assistant Professor, Department of Economics, SOAS, University of London
Fellow, Institute for Manufacturing, Cambridge University Engineering Department
Member, IPD-JICA Task Force, Columbia University
Outline

1. The new industrial policy frontier

2. The new international industrial policy variety

3. Emerging trends and focal policy domains

4. Five propositions for a new EU industrial policy integrated system
Recent research works


The New Industrial Policy Frontier:

- New rationales and models for policy action
- New worlds of manufacturing production
## The new industrial policy frontier

<table>
<thead>
<tr>
<th>Main features</th>
<th>First wave 40s to mid-70s</th>
<th>Second wave Mid-70s to 90s</th>
<th>Third wave 2000s</th>
<th>Emerging themes 2010s</th>
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</thead>
<tbody>
<tr>
<td><strong>Development as/through</strong></td>
<td>Industrialisation and structural change</td>
<td>Stabilisation, liberalisation, and poverty reduction</td>
<td>Global knowledge economy</td>
<td>Learning economy and Innovation in production</td>
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<tr>
<td><strong>Policy target/s</strong></td>
<td>Creating markets Structural change and diversification</td>
<td>Specialisation and modernisation (Market-led)</td>
<td>Innovation Increasing productivity Diversification and specialisation</td>
<td>Industrial ecosystem development</td>
</tr>
<tr>
<td><strong>Policy framework</strong></td>
<td>Import Substitution/Export oriented Selective industrial policies Sectors development Gradual opening to competition</td>
<td>The best industrial policy is “no industrial policy”. Horizontal policies Exposure to competition FDI attraction</td>
<td>Targeted strategies in open economies Increasing national competitiveness Enabling business environment Strategic management of FDI</td>
<td>Smart (new selective) policies Value creation in global systems Value capture in production networks Competences/capabilities</td>
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<td><strong>Policy model</strong></td>
<td>Top-down Centralised system National agencies/councils Developmental institutions</td>
<td>Minimal state (Weakening and/or dismantling of national institutions)</td>
<td>Multi-layered (Top-down/Bottom-up) Public-private identification of priorities. Science institutions</td>
<td>Multi-layered Institutions for public-private coordination Multi-level implementation Regional/cities clusters development</td>
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<td><strong>Policy package/s</strong></td>
<td>Capital movement management Production-oriented finance National champions development Infant industry protection Hard infrastructure development Public funded research Compensation policies for lagging areas.</td>
<td>Innovation policies ICT diffusion Competitiveness programmes Human capital SMEs support (regional level)</td>
<td>Credits and grants for production development and innovation Public procurement Promotion of entrepreneurship (venture capital, angel investors and support to business capabilities) Hard and soft infrastructure Technical competences and skills development</td>
<td>Technology infrastructure &amp; intermediate R&amp;D&amp;M institutions Manufacturing research Scaling up Strategic public procurement General purpose technologies Key enabling technologies Risk reduction Manufacturability challenges</td>
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<td><strong>Policy rationales</strong></td>
<td>Market failures Structural coordination</td>
<td>Reduction in the room of manoeuvre (WTO, TRIPS commitments, etc.) and low political legitimacy of national development strategies.</td>
<td>Market failures System failures</td>
<td>Learning and System failures</td>
</tr>
<tr>
<td><strong>Policy space</strong></td>
<td>High room of manoeuvre and high political legitimacy of national development strategies</td>
<td>Moderate room of manoeuvre in traditional fields; regain of legitimacy of national development strategies</td>
<td>High room of manoeuvre in emerging fields</td>
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Industrial policy debate: rationales evolution

Market failures (Horizontal policies)
- Asymmetric information
- Incomplete markets
- Imperfect information
- Imperfect risk markets
- Agglomeration/localised externalities
- Externalities in learning & discovery
- Industrial commons (collective capabilities)

Structural coordination problems (Selective policies)
- Interdependencies between competing activities
- Capabilities development (infant industry/conditionality)
- Transition problems
- Lock-in problems
- Interdependencies among complementary activities
- Quasi-public good technologies
- F/Inf Rules & incentives (lack of congruence)
- Institutional system failures

Learning and System failures (Smart policies)
- Knowledge gap & transfer failures
- Capital market imperfections
- Public goods (infrastructures)
- Information externalities
- Incomplete markets
- Capital market imperfections
- Externalities in learning & discovery
- Industrial commons (collective capabilities)
New worlds of manufacturing production: beyond vertically integrated sectors

- Modern manufacturing systems, beyond sectors and national boundaries

1. Modern manufacturing systems consist of complex interdependencies, *often across a range of industries*, which contribute a variety of components, materials, production systems and subsystems, producer services and product-related service systems.

2. Modern manufacturing companies orchestrate production processes through complex producer networks spanning across countries, as well as *different industrial sectors*.
New worlds of manufacturing production: New value creation/capture opportunities

- Processes of value creation and national value capture are changing in nature

1. Value is nested in specific functional tasks
2. Value is created through the combination (and recombination) of increasingly complex technology systems and platforms (KETs and multi-KETs pilot lines)
3. Diffused production technologies and competences are also critical for value creation: manufacturing scaling-up competencies (PIE-MIT)
4. Value is captured by major companies (system drivers) commanding critical stages of sectoral value chains
5. Cross-sectoral innovations: applications of similar technical innovative solutions across and within sectors
The New International Industrial Policy Variety
What works?
Understanding industrial policy variety

Industrial policy effectiveness depends on:

1. Industrial policy models and governance systems: top-down / bottom-up / multi-layered

2. Industrial policy measures and packages of interactive measures: policies do not work in isolation

3. Industrial policy levels of policy actions: sector, mfg system, industrial system and macro-framework
Understanding industrial policy variety: ‘Policy package matrix’ – PPM

<table>
<thead>
<tr>
<th>POLICY MODEL &amp; LEVELS OF POLICY ACTIONS</th>
<th>INDUSTRIAL POLICY PACKAGES</th>
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<tr>
<td>National/Federal</td>
<td>Manufacturing sectors</td>
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<td></td>
<td>Manufacturing system</td>
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<td></td>
<td>Industrial system</td>
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<td>Regional/State</td>
<td>Manufacturing sectors</td>
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<td></td>
<td>Industrial system</td>
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<td>POLICY linkage</td>
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<th>INACTIVE POLICY measure</th>
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<td>Active Policy measure</td>
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- Innovation and Technology infrastructure
- Higher education and workers training
- Production capacity and advanced mfg operations
- Long term capital access
- Resources access
- Infrastructure and networks
- Internal Demand & Public procurement
- External demand and Intl Market development

![Policy Package Matrix Diagram]
Emerging trends and focal policy domains
Innovation and technology infrastructure

- **NNMI - National Network for Manufacturing Innovation & Mission oriented initiatives:**
  - network of regional ‘Innovative Manufacturing Institutes’ designed to accelerate the development and adoption of advanced manufacturing technologies, new models for workforce development and access to state-of-the-art equipment and infra-technologies
  - complemented by high-tech mission oriented initiatives (Robotics Centre and Materials Genome Initiative)

- **Fraunhofer-Gesellschaft Institutes**
  - network of 57 institutes (18,000 staff) specialising in joint pre-competitive research, prototyping and manufacturing scale-up, as well as product-idea commercialisation, bilateral applied research with individual firms and technology transfer schemes.
  - cutting-edge research includes various sectors and technology platforms such as optics, photonics, micro-electromechanical systems, advanced and composite materials, advanced machining.
  - undertake collaborative manufacturing research and address technological and manufacturing challenges for the entire industrial system (big and small companies, public sector included).

- **Kohsetsushi Centres**
  - 262 regional offices (182 centres) specialising in testing, trial production and scale-up, as well as training services
  - a number of sector-focused centres also support SMEs in the adoption of new advanced technologies and conduct joint applied research
  - complemented by cutting-edge research institutes, such as the National Institute of Advanced Industrial Science and Technology (AIST)

- **Torch Programme**
  - STIPs – Science and Technology Industrial Parks
  - Productivity promotion centres
  - Technology Business Incubators
Financial infrastructure, hybrid industrial finance and strategic public procurement

- **Small Business Investment Company (SBIC) and the Small Business Innovation Research and Technology Transfer (SBIR/STTR):** combine loans, R&D grants and pre-commercial public procurement to support small businesses, OEMs and specialist manufacturing contractors.

- The **Bank for Reconstruction (KfW)** operates as a long-term refinancing bank specialised in lending to banks working with industries. The financial infrastructure also includes the German Bank for Settlements (AG), special programme like the ZIM and an articulated multi-layered system of public saving banks and credit cooperatives working with SMEs.

- **Japanese Development Bank (JDB)** and other public financial institutions, such as the Long-Term Credit Bank of Japan and the Industrial Bank of Japan.

- The **InnoFund** offers loan interest subsidies and equity investment to high-tech domestic SMEs (Chinese-owned companies with less than 500 employees, 30% of which technicians) willing to invest in emerging technologies and product commercialisation.
Energy-related industrial policies

• **Clean-energy initiatives**, mixing loan guarantees for renewable energies, electricity transmission projects, and smart grids, as well as grants for batteries and advanced materials. Additionally, a new mission-oriented research venture in energy coordinated by ARPA-E (Advanced Research Projects Agency—Energy).

• **German Renewable Energy Act** (and **New Energy Policy Package** including 120 measures): as a result of these energy policies, Germany is today the world’s biggest photovoltaic market (75% of cell and 60% module production capacity in Europe) and had 30% of total wind power capacity in Europe (12% in the world).

• **Strategic Energy Plan** (and the **Fourth Science and Technology Basic Plan**) major reforms including the introduction of a multi-layered and diversified flexible energy supply-demand structure; the development of an advanced energy-saving society and the achievement of a grid parity in medium-long term; the re-establishment of a nuclear energy policy.

• Energy policies mainly via technology and sector-specific initiatives: for example Advanced Energy is one of the 8 R&D programs in ‘cutting-edge technological areas’
Five propositions for a new EU industrial policy system

1. EU cross-border intermediate R&D institutes
2. EU financial infrastructure: Development banks & diffused industrial finance
3. EU Energy policy for manufacturing industrial competitiveness
4. EU mission oriented initiatives for future markets & industry creation
5. EU new multi-layered governance model
European ‘Cross-border’ intermediate R&D institutes

- Restructuring and integration of national intermediate R&D institutes (Fraunhofer leading model in EU but also Catapults in UK, ITT in Italy, etc.)
  - Towards better exploitation of European industrial research, ‘complementarities discovery’ and scale/scope economies
  - Beyond duplication efforts, regional polarisation and increasing structural dualism

- Focal functions:
  1. Providing quasi-public good technologies
  2. De-risking investments in emerging technologies and supporting technology development & demonstration (focus on critical stages/valley of death TRLs 4-7)
  3. Supporting cross-regional systems integration
  4. Supporting industrial sectors restructuring and sectoral transition
  5. Supporting the re-building of diffused industrial competences (i.e. industrial commons)
(2) European financial infrastructure: development banks and ‘diffused’ industrial finance

- Rebuilding of the European financial infrastructure around:
  - Development banks, both national and EIB, as critical ‘operational arms’ for financial support schemes but also
  - Diffused industrial finance, based on public financial support schemes and new industry-specific risk assessment metrics / patient capital

- Variety of financial instruments and effectiveness
- Financial support schemes including loans, long-term financing, matching grants, pre-commercial public procurement and financial guarantees, to mention just a few are widely adopted (e.g. SBIR in US, InnoFund in China, FNDCT in Brazil, MCEP in South Africa).

- The effectiveness of these schemes depends on the degree of selectivity of the financial support provided (i.e. the investment conditionality and technological requirements attached to it) and the presence of a broader financial infrastructure.
(3) European Energy policy for manufacturing industrial competitiveness

- Transforming the energy constraint and international disadvantage (US States’ fracking and shale gas initiatives) in an opportunity for:
  - Green technology development *but also*:
  - Increasing industrial systems process efficiency
  - Increasing housing energy efficiency
  - Selective mobility infrastructures development
  - Levelling the playing field within Europe (energy costs as major factor affecting industrial competitiveness differentials)
(4) EU mission oriented initiatives for future markets and industry creation

- EU-level mission oriented initiatives focused on:
  - ‘Global technological challenges’ and ‘lead markets of tomorrow’
  - European integration challenges (periphery re-industrialisation)

- Reaching scale for sustaining the global manufacturing and technological race

- **Unlocking KETs and multi-KETs potential** (such as nanotechnology, micro- and nanoelectronics including semiconductors, advanced materials, biotechnology and photonics):
  - Public industrial projects around cutting-edge technologies for de-risking first movers and creating new markets
  - Public industrial projects triggering inter-sectoral application and learning around multi-KETs applications
(5) EU multi-layered governance model

- Development of a new industrial policy model and integrated governance system
  - Focusing on policy package effectiveness
  - Focusing on industrial policy coherence and alignment over time
    ('multi-layered' policy models are more flexible but run the risk of incoherence and different levels undermining each other)

What is the most effective governance model (and related level of policy action)?
Summing up

1. Understanding the new challenges at the industrial policy frontier

2. Scanning international industrial policy variety

3. Learning from emerging trends and focal policy domains

4. Five propositions for a new EU industrial policy integrated system
aa155@soas.ac.uk

THANKS