



UNIVERSITY OF
CAMBRIDGE



Cambridge Industrial
Innovation Policy

BABBAGE
FORUM

Meeting report

Global Industrial Innovation Policymaking Emerging Needs & Opportunities

A meeting of international industrial
innovation policymakers

Churchill College, Cambridge 26th September 2023

Foreword

Over the past three years the Babbage Forum has conducted a series of studies into the industrial innovation policymaking practices in ten countries, namely China, France, Germany, Italy, Japan, Korea, Singapore, Sweden, UK and the US. While the context and approaches of different countries vary significantly, the study reports, supplemented by a series of national policymaker meetings, identified a series of themes which describe some common characteristics and challenges of industrial innovation policymaking.

On the 26th September 2023, the Babbage Forum brought together senior invited policymakers and academics from twelve countries to jointly explore the findings of the studies, and industrial innovation policymaking more generally, in the context of a rapidly evolving global landscape.

Presentations by leading figures from Europe, USA, China and Asia introduced the contexts in their respective regions. A series of roundtable discussions then explored the issues affecting future industrial innovation policy making.

This report provides a summary of all plenary and roundtable discussions including links to supporting reports and videos of the full keynote presentations.

Many participants felt that the meeting provided a rare opportunity for industrial innovation policymakers to exchange views privately without the political constraints of more established fora.

Professor Sir Mike Gregory
University of Cambridge

The logo for the Babbage Forum, featuring the words "BABBAGE" and "FORUM" stacked vertically in a white serif font, enclosed within a dark red rectangular border.

BABBAGE
FORUM

Contents

- 1. Meeting Agenda**
 - 2. Executive Summary**
 - 3. Session 1: Industrial Innovation Policy – Foundations**
 - 4. Session 2: Global Context**
 - 4.1. Europe
 - 4.2. USA
 - 4.3. China
 - 4.4. Asia
 - 5. Session 3: Current and future industrial policy**
 - 5.1. What are the most significant emerging industrial policies?
 - 5.2. What are the national and global risks associated with those emerging industrial policies?
 - 5.3. How are nations responding to those risks?
 - 5.4. How do we balance national and global industrial innovation policy priorities?
 - 6. Session 4: Sharing and improving policy practice**
 - 6.1. Policymaking competencies
 - 6.2. Managing policymaking ecosystems
 - 6.3. Evaluation and policy learning
 - 6.4. Industrial Capability Characterisation
 - 7. Session 5 – Developing and delivering industrial policy**
-

1. Meeting Agenda

Session 1 – INDUSTRIAL INNOVATION POLICY: The Babbage Review—Presentation

Foundations of industrial policymaking including common characteristics, challenges and needs as derived from the recently completed exploratory study of industrial innovation policymaking in ten leading industrial countries.

Session 2 – THE GLOBAL CONTEXT—Keynotes

Keynote presentations on the key global regions, Asia, China, Europe and USA including the current drivers, trends and concerns for industrial policymakers in a national and international context.

Speakers in this session addressed, for each region:

- Key regional drivers of industrial innovation policy
- Current industrial innovation policy objectives
- Recent regional industrial innovation policy developments
- Emerging industrial innovation policy trends and their implications

Session 3 – CURRENT AND FUTURE INDUSTRIAL POLICY—Roundtables

Roundtable sessions sharing participants' national experience of current policy objectives, development, and challenges such as: technology sovereignty, supply chains (including raw materials) and policies of other nations. Contributions were focused by addressing specific domains such as:

- Energy
- Semiconductors
- Health

Participants were asked to consider the implications of the global context session with examples from their respective nations as appropriate.

Session 4 – SHARING AND IMPROVING POLICY PRACTICE—Roundtables

The Babbage Forum national reports identified a lack of process and capabilities in industrial innovation policy, compared to other policy areas. This second roundtable session invited participants therefore, to draw together key lessons from the earlier sessions and identify effective practices, challenges and opportunities for future policy development. The discussion, among other things, considered:

- Policymaking competencies
- Policy evaluation and legacy learning
- Industrial capability characterisation
- Managing policymaking & implementation ecosystems

Session 5 – DEVELOPING & DELIVERING INDUSTRIAL INNOVATION POLICY—Plenary

Following the days' proceedings, this final plenary session invited participants to consider emerging policymaking needs and responses. Focusing on what is most useful to policymakers, it highlighted new insights and identified opportunities for the sharing and development of effective practices.

2. Executive Summary

The first session set out the initial findings of the Babbage Forum national studies in the form of a set of 'principles' which were believed to underpin effective industrial innovation policymaking. They provide a framework for designing and reviewing industrial innovation policymaking processes.

The second session heard keynote presentations from leading figures in industrial innovation policymaking - Giulia del Brenna, Rob Atkinson, Professor Xiaobo Wu and Professor Arnoud de Meyer. They reviewed current and emerging approaches and priorities in Europe, USA, China and Asia respectively. The presentations were extremely well received and provided an excellent foundation for the subsequent discussions. Recurring themes included: self-sufficiency, resilience, energy, security and of course environment and sustainability.

The two major roundtable sessions involved small group discussions with a mix of national officials and academics. The deliberations were captured as they progressed and reported back to the group as a whole. The richness of the discussions is captured in some detail in the body of this report.

The first roundtable session addressed emerging industrial policies in the participating countries, the implications of those policies and the responses. Themes arising during the roundtables reflected those highlighted by the introductory speakers as well as the challenges faced in balancing national and global interests. Recurring topics included the societal implications of industrial policies and the importance of multi-lateral organisations.

The second roundtable session focused on sharing and improving policymaking practice. The emphasis was on identifying approaches that have been found to work successfully but also highlighting areas where things do not work well. There was a broad agreement on the need for better training and preparation of officials charged with developing industrial innovation policy to ensure sufficient breadth, experience and multi-disciplinary awareness. The challenges of managing policymaking 'ecosystems', and the importance of evaluation and policy learning were also recognised.

The final plenary session invited participants to make additional contributions or reflect on the proceedings of the day. The session served to draw together observations around which there appeared to be a consensus and to articulate perceived challenges.

The benefits of sharing perceptions and practices across nations were widely appreciated. Examples included the Chinese bottleneck analysis to identify the implications of decoupling and Singapore's use of novel 'transformation maps' to enable the systematic identification, development and growth of strategically important sectors.

Governance and interagency coordination, or lack of it, in industrial policy was a recurring theme. Innovative approaches to coordination between agencies within and across countries are needed as well as new mechanisms to bring together diverse authorities and ensure effective collaboration in implementing industrial innovation policy.

Recognition of the renewed interest in industrial innovation policy globally underpinned the meeting. The changing international environment has led many countries to review their position and priorities. Ultimately, however, it is the companies, from start-ups to large corporations, that bring products to markets. Future meetings should consider how best to integrate the industrial perspectives more directly into Babbage proceedings.

Education and workforce development were highlighted as integral to effective industrial innovation. This applies to the education of industrial innovation policymakers themselves but also to the development of talent and expertise to meet the staffing demands of delivering and executing industrial innovation policies. A long-term view is essential given the time necessary to prepare people for the more sophisticated roles.

Many challenges face industrial innovation policymakers, not least growth challenges in China, spending limits on industrial policy, even in wealthy countries, and a rapidly evolving international order. Participants felt that the meeting had provided a unique opportunity for the international industrial innovation policy community to meet at the professional rather than political level and the organisers were strongly encouraged to arrange future events along similar lines.

Deliberations

3. Session 1 – Industrial Innovation Policy – Foundations (plenary)

In its recent work, the Babbage Forum has reviewed approaches to industrial innovation policymaking in ten countries - China, France, Germany, Italy, Japan, Korea, Singapore, Sweden, UK and USA. The initial findings were published in March 2023 and are available [here](#), this work continues with a series of national meetings.

While contexts vary, a degree of consensus is emerging about the essential characteristics of effective industrial policymaking systems, ‘principles’ which might be used to guide the design of new policymaking arrangements, but more immediately to ‘audit’ current practices.

‘Principle 1’ – Ensure that responsibilities for objective setting are clear and that the objectives are, wherever possible, precise and quantitative.

‘Principle 2’ – Provide effective processes for mapping relevant sources of knowledge, the links between them and their contexts and biases.

‘Principle 3’ – Provide industrial innovation policymakers with sufficient cross-disciplinary expertise to deliver, as well as design, industrial policies.

‘Principle 4’ – Provide access to data and methods to enable the national competitive position to be analysed, by sector, technology and emerging industries.

‘Principle 5’ – Address scale-up from the earliest stages of policy making for emerging technologies and industries.

‘Principle 6’ – Build in evaluation and learning routines from the earliest stages of policy development.

‘Principle 7’ – Reflect regional as well as national assets, capabilities, needs and opportunities.

4. Session 2 – The Global context (keynotes)

The current drivers, patterns and trends in the key global regions, Europe, USA, China and Asia were introduced through four excellent keynotes provided by Giulia del Brenna, Rob Atkinson, Xiaobo Wu and Arnoud de Meyer respectively.

4.1. Europe

Giulia del Brenna highlighted the critical themes surrounding the European Union's industrial policy and its evolution in response to significant events, particularly the COVID-19 crisis and the policymaking of other nations. The impact of the pandemic on the EU's industrial landscape was profound. The crisis exposed vulnerabilities in the supply chain and emphasised the importance of effective industrial innovation policy to address challenges in manufacturing, green transitions, and digital advancements.

The EU's responses to US legislation, including the Chips Act, Green Deal industrial plan, and the Net Zero Industry Act stimulated a commitment by the EU to shape its industrial future with a focus on sustainability, resilience, and economic security. The shift in approach included moving beyond traditional notions of competitiveness to promote sustainable competitiveness aligned

with social and environmental objectives. The EU's emphasis on strategic autonomy, economic security, and skills development reflects a comprehensive and forward-looking approach to industrial policy. Political choices are involved in selecting technologies and the need for diversified and resilient supply chains, recognizing the complex interplay of economic, social, and geopolitical factors in shaping the EU's industrial strategy.

Giulia Del Brenna's full presentation is available [here](#).

4.2. USA

Rob Atkinson presented an independent view of US industrial policymaking, reflecting on past industrial innovation policies and drawing parallels with the challenges faced during the Japan challenge in the 1980s and 90s. Noting the absence of a centralised body focusing on industrial innovation in the current U.S. government, he highlighted the decline in U.S. manufacturing and productivity growth, particularly in comparison to China.

China has become a key driver of U.S. industrial policy with a growing recognition of its strategy to become a global leader in advanced industries. The involvement of the defence department in passing recent key bills was cited as further evidence of a broader trend of policy being driven by concerns about national security and geopolitical stability.

There were concerns about the political dynamics influencing the focus on technology and industry, various elements of the industrial policy, including the Manufacturing Extension Partnership, Infrastructure Investment and Jobs Act, and Buy America initiative. Criticism was being directed at the Biden administration for politicising program implementation.

Looking ahead, he outlined challenges, including the dominance of neoclassical economists opposing such policies, the unlikelihood of similar massive spending in the future due to budget constraints, and the enduring ideological divide between Republicans favouring free markets and Democrats advocating for "green equity." Additionally, he highlighted the bipartisan consensus on pushback strategies against China, covering areas like foreign direct investment review and export controls for semiconductors.

There is a lack of a coherent national strategy and federal government capabilities for in-depth sectoral analysis. In contrast this with prevailing doctrines such as neoliberal economics, left-wing populism, and Trumpian nationalism. Rob Atkinson called for a shift toward "national developmentalism," - a holistic approach that utilizes state intervention to drive essential national goals.

Rob Atkinson's full presentation is available [here](#).

4.3. China

Professor Xiaobo Wu provided a comprehensive overview of China's evolving industrial innovation policies tracing the key drivers of China's industrial innovation policy, including the importance of science and technology, back to the market-oriented reforms initiated by premier Deng Xiaoping.

The objectives of China's industrial innovation policy are focussed on long-term foresight and ambitious targets have been set for becoming global innovation leaders by 2030 and 2050. Detailing the policy-making processes in China, Professor Wu described the involvement of multiple institutions at both the national and local levels when developing the five year plans that are so integral to policymaking. Noting the significance of systemic thinking and the role of the National Congress, China has formed a structured and iterative process with the potential for significant changes during the execution of five-year plans.

The presentation addressed six points related to trends and the trajectory of Chinese industrial innovation policy including, decoupling, high-end import substitution, carbon emission reduction, a shift towards upstream innovation, debt financing and talent cultivation.

Though detail of these six trends were discussed, it was the scale of the STEM graduate pipeline and the rate of successful breakthroughs in identified “bottlenecks” resulting from decoupling, that drew particular attention.

Professor Wu’s full presentation is available [here](#).

4.4. Asia

Professor Arnoud De Meyer began by acknowledging the diverse nature of the region, encompassing both highly industrialised and less developed nations. Ranging from wealthy states like Singapore to less developed nations like Cambodia and Myanmar, the common thread across ASEAN countries is a commitment to import substitution and localization, with a shared implicit goal of deriving 20% of GDP from manufacturing.

Insights were drawn from the reports produced by the Babbage Forum on Japan and Korea. In both countries, mature organisational structures and processes for industrial policy, primarily focusing on upstream science and technology development are clear. However, there are recognised challenges, including a lack of multi-agency coordination and insufficient international collaboration. Professor De Meyer observed a shift in focus towards applied development and stimulating startups in recent years, signalling a departure from the traditional emphasis on larger industrial companies.

The three main characteristics highlighted are the consensus-building nature of ASEAN, its emphasis on connectivity in various forms, and the significant investments made by key member states, especially Singapore, in research and development as well as higher education.

The emphasis on consensus is driven by reactions to global events, and connectivity plays a crucial role in ASEAN's strategy, encompassing physical and people-to-people connectivity along with a broader focus on connectivity in various sectors.

Singapore's role as an informal leader within ASEAN was noted, particularly in the areas of research and development and higher education. For example, the emphasis in Singapore on deepening industrial capabilities rather than adding new sectors, is an approach now being followed by other ASEAN countries, reflecting the collaborative and learning-oriented culture of the region.

Six challenges influencing industrial innovation policies in ASEAN were also addressed during the presentation. These challenges include sustainability and global warming objectives, demographic tensions between aging and young populations, digitalization with a specific focus on data localization, supply chain restructuring, the pursuit of strategic independence in response to geopolitical divides, and the impact of China's Belt and Road Initiative (BRI). The potential long-term threats arising from the rise of industrial policy in the U.S. and the European Union were also acknowledged with ministers from Malaysia and Singapore expressing concerns about potential disruptions in investments into Southeast Asia due to these industrial policy shifts.

Professor De Meyer’s full presentation is available [here](#).

5. Session 3 – Current and future industrial policy (roundtables)

Roundtable sessions were an integral part of the meeting and involved diverse groups of policymakers and academics from different countries sharing experience and perceptions. The roundtable highlighted the challenges posed by complexity, the need for realistic timelines, the importance of measurement, coordination, resource allocation, long-term strategy, workforce education and the necessity of honest global conversations in shaping effective industrial policies.

The first roundtable focussed upon the modern reality of global geo-political shifts and the profound implications they can be expected to have for national industrial innovation policies. With four specific questions to consider, participants shared and explored responses to, and implications of, this changing global context.

5.1. What are the most significant emerging industrial policies?

Overview

The debate on whether to emphasise innovation policy or industrial policy surfaced. The consensus leaned towards innovation policy due to the negative connotations associated with traditional industrial policies although acknowledgement was given that many governments have warmed to an area of policy that was previously unmentionable.

Participants naturally explored specific policies such as the US IRA, Chips Act, European Chips Act, Buy America, and defense technology investments given the impact they have on the domestic and global landscape. The importance of functional procurement, where needs are described rather than specific products was clear and there was a keen focus on the effectiveness of these policies, particularly in terms of private sector uptake and the potential for leveraging private investment.

Fear has clearly emerged as a key driving force behind industrial innovation policy, with concerns about other countries progressing faster or implementing policies that will negatively impact other nations. Global competition is still of primary concern, however this is now underpinned by a sense of protectionism against and mitigation of perceived deglobalisation. Though smaller nations were particularly concerned, the discussions did also note that there is a potential exaggeration of US-China conflicts with participants recognising and emphasising the interdependence between the two nations.

In this context, key objectives for policymaking included; leveraging cutting-edge technologies, bolstering supply chain resilience, and ensuring domestic self-sufficiency, particularly in critical areas like energy and defence. Common across a number of nations and regions was a specific push to re-shore or friend-shore critical sectors for national security and to gain independence from China. The disruption caused by reshoring processes, and the challenges of controlling entire supply chains were discussed. COVID showed that nations can't have just-in-time production only and it will be essential to keep an eye on the bigger picture as the reshoring process could disrupt or even destroy existing value chains. The discussion noted that many countries were picking similar industrial priorities, with an interesting shift in focus by nations from catching up to maintaining a global role in advanced technology.

Decarbonisation and sustainability policies were highlighted as global priorities not only on a nation-by-nation basis but also with the understanding that worldwide approaches are required. The challenges of implementing carbon border adjustment mechanisms and the complexities of green transformation were discussed, especially in countries like Norway with significant Oil & Gas sectors. At the industry level, the transition to Industry 4.0 and the future of industrialization were explored through company lenses with acceptance of a need to engage effectively with large

business around these agendas. Energy was identified as a major driver for investment, especially in intensive manufacturing. There was a call to decompose energy policies into tech components, addressing grid, generation capacity, industrial transformation, hydrogen, agriculture emissions, electric vehicles, and housing fabric.

Regional policies were categorised into free-for-all, strategic localism, and decentralised approaches. The need for a balance between competition and coordination in regional industrial policies was emphasised with a clear need for coordination at the local and country level to avoid uncoordinated behaviour at the local level. An example cited was in Canada: tax incentives provided by provinces always focus on the same industries, so there is a degree of competition between provinces.

The importance of coherence between technology and workforce development was noted and that with a focus on upskilling and reskilling to address challenges posed by aging populations and immigration, education and skills are critical components of industrial innovation policy. The importance of patient capital for universities, avoiding bureaucratic obstacles, and the role of global interest in education were underscored.

Highlights by group

Group 1.

- The most significant specific emerging industrial policies discussed include the US IRA (Investment in American Industry and Recovery Act) and the Chips Act, The European Chips Act is also highlighted as an important policy and The "Buy America" policy which considered more significant than the IRA.
- Canada is exploring complementary policies to the US industrial initiatives.
- Sustainability policies, such as carbon border adjustment mechanisms, are emphasized globally, with a call for increased global collaboration in this area. Mission-oriented approaches are recommended.
- Education policies are mentioned, such as technical education in the Draghi government in Italy and Chinese education policy with a long-term perspective. Skills development is emphasized not only in industry but also in government.

Group 2.

- The importance of supply chain coherence and the impact of geopolitical changes on industrial policies.
- A focus on the three pillars of industrial innovation policy: technology development, workforce development, and supply chain development.
- Emphasis on the need to collaborate with large companies in shaping industrial policies.
- Debate on whether it's more effective to frame policies as innovation policy rather than industrial policy.
- Exploration of the future of Industry 4.0 and the role of supporting university innovation while maintaining its link to the industrial structure.
- Discussion of the concept of "patient capital" for universities to promote innovation.

Group 3.

- Focus on energy security and environmental/climate transition, necessitating innovative technologies and avoiding reliance on foreign production, particularly in critical areas like batteries and solar cells.

- Acknowledging the importance of skill development and rapid adoption of technology for industrial growth.
- Emphasising the need for economies of scale to handle intricate and critical supply chains, such as those in healthcare and defense.
- Countries are motivated by fear of falling behind in industrial policies, especially in Europe, and are aiming to re-shore key industries for national security.

Group 4

- Emerging industrial policies include new government finance initiatives available at various stages of industrial processes, with a focus on dual-use companies in the US.
- There are defense technology development investments being made in certain regions.
- In Korea, the focus is shifting from catch-up to maintaining a global role in advanced technology, particularly in securing supply chains due to a lack of domestic resources.
- The concept of the "twin transition" is gaining prominence, addressing green issues and socioeconomic challenges, involving the adaptation of industrial structures to reduce emissions and combat climate change, as seen in Italy's focus on the circular economy.

Group 5.

- Distinguishing between horizontal and vertical perspectives in industrial policies, with a focus on overlapping services and manufacturing. Noted deficiencies in the UK's horizontal policies.
- Examining regional industrial policies, including typologies in China, France, and Germany, and the importance of balancing national and regional policies. Emphasizing the attraction and retention of skilled labour in regional hubs.
- Highlighting the role of social policies in supporting industrial innovation and considering societal factors such as aging populations and emigration. Emphasizing the importance of social dialogue in ambitious industrial policies.
- Addressing the need for new manufacturing systems in the US and challenges related to low productivity and environmental concerns.

5.2. What are the national and global risks associated with those emerging industrial policies?

Overview

Participants were concerned by the surge in nationalism and protectionism around industrial policy whether it is around global competition, supply chain resilience, specific technologies or individual sectors. Particularly pronounced among affluent nations, this trend signifies a trade-off between economically rational approaches, such as globalisation and specialisation, and the defensive postures of states safeguarding their interests. Combined with the growing trend of viewing trade and industry within a national security rather than strictly growth and competition context, the challenge will lie in establishing a framework that reconciles these conflicting forces.

This interplay between resilience and protectionism significantly influences policymaking, urging a deeper understanding of supply chains and collaboration between the private and public sectors. The concepts of decoupling, de-risking, and renationalising, based on geopolitical relationships rather than core competencies, add another layer of risk and the hypothetical scenario of China or other nations halting the export of raw materials poses a further threat to global stability.

Europe, for example, in response to US policies, is compelled to reduce dependencies, highlighting the nuanced nature of trade relationships that sometimes supersede contested policies. The

prevailing focus on securitisation therefore can and needs to be counterbalanced with increased collaboration, particularly in addressing global challenges, as avoiding a zero-sum game and striking a balance on dependency becomes crucial. On a systems level this trend will inevitably create barriers that will in turn decrease the net efficiency of the world.

Historic parallels were noticed with acknowledgement of the palpable risk of repeating the path of the 1930s where a similar shift towards national sovereignty influencing policymaking was marked by economic collapse and heightened international tensions.

Inequalities, both within and between countries, are at risk of being exacerbated. Regional inequalities resulting from industrial policy were demonstrated by decarbonisation/net zero policy trends. New green jobs tend to concentrate in urban areas potentially leaving the middle class unaffected or upskilling whilst rural and traditional manufacturing communities fail to transition or benefit. Effects can also be seen at the national level, particularly in China where transitioning from low-cost labour to higher-end industries poses challenges for traditional sectors and SMEs, leading to rising unemployment rates.

Internationally, the discourse around Ricardian economics, the cost of living crisis, and the need for complementary public policy instruments underscores the multifaceted nature of challenges associated with industrial policies. However, medium and small countries find themselves at a crossroads, compelled to make choices forced upon them by the global West and China. The levels of current spending on industrial policy further emphasise international inequalities posing further risk to medium and smaller countries who often, it was observed, are prioritising the same industries and technologies as larger nations. Public spending and the economic landscape is further complicated by the burden of increasing debt at a time when substantial investments, particularly in greening, are needed. Unsustainable levels of government investment in industrial policy, exemplified by the costs associated with massive programs, pose significant challenges for many countries.

Competition for high-value segments within the same sectors intensifies, prompting consideration for more coordination and collaboration rather than exclusive competition, difficult at a time of increased nationalism. Political interventions, such as a change in the US administration, add an additional layer of risk does the potential for the potential self-defeat of industrial innovation policies and a neoclassical resurgence. These are perceived as real risks with examples like Korea cutting R&D budgets due to an overreliance on a robust private sector.

The policymaking ability is hindered by the quality of political leadership, often lacking evidence-based decision-making. Flawed or inadequate data compounds the challenges, with much of the uncertainty associated with industrial policies stemming from a lack of clear information and outdated statistics. Risks associated with industrial strategy also include ambitious plans lacking a clear understanding of competitiveness, such as in the case of semiconductors. The ability to measure innovation becomes a critical factor in policymaking, necessitating collaboration between the public and private sectors.

Practical risks are associated with demographic, energy, integration, climate, and technological challenges. The ownership of data and critical international relationships poses a potential danger, especially if some countries control key data. Critical skills disparities present differing challenges between developed and developing countries. While the US focuses on addressing long-term skills deficits through government initiatives, Germany anticipates a low-skill labour deficit due to retirement, necessitating immigration. In Japan, the decline in engineering graduates poses a threat to investments that historically capitalize on a highly skilled labour force and the cultural barriers to promoting vocational education in some nations like the UK add an

additional layer of challenge. Overall the importance of retraining and redeploying workers, and the global differences in addressing the skills gap were all highlighted as critical considerations in the broader landscape of industrial policies.

Highlights by Group

Group 1.

- Inequality is identified as a major risk, both within and between countries. New green jobs may be concentrated in urban areas, potentially leaving the middle class behind, and the fate of jobs lost in manufacturing is uncertain.
- Protectionism is seen as a risk, with potential destabilizing effects on the global economy. Trade is considered a "peacekeeper" due to interdependence.
- Debt is a concern, especially as economies require substantial investments in greening. The impact of government deficits on interest rates and the cost of capital is discussed.
- The resurgence of neoclassical ideologies is viewed as a risk, potentially undermining industrial innovation policies, particularly as the private sector gains prominence.

Group 2.

- Identified practical and theoretical risks, including integration challenges, new technologies, demographic shifts, energy concerns, and climate change.
- Concerns about nations pursuing high-value segments within the same sectors, potentially leading to a lack of coordination.
- Emphasis on the quality of political leadership and the need for policy consistency over time.
- Recognition of the need for better data on services and manufacturing, as well as innovation measurement.

Group 3.

- National Security and Geopolitical Turbulence: Industrial policies are evolving in an uncertain geopolitical climate, necessitating a balance between resilience and technology-led growth, given disruptions like those caused by COVID-19.
- Historical Risks and Catastrophes: Concerns about repeating historical economic collapses and rising tensions between nations, accompanied by potential catastrophic events.
- Reshoring Risks and Economic Competitiveness: Risks associated with reshoring initiatives, potential economic competitiveness, and the need to balance self-sufficiency with collaboration and coordination.

Group 4

- Risks associated with emerging industrial policies include the availability of critical skills, which varies between developed and developing countries.
- Costs are a significant concern, as most countries cannot afford massive policy programs.
- There is a risk of decoupling, de-risking, and renationalizing based on geopolitical relationships rather than core competencies and competition, potentially leading to reduced collaboration.

Group 5.

- Large, Medium, Small Countries: Analysing national and global risks associated with emerging industrial policies, with a focus on countries like Singapore facing choices between aligning with the West or China.

- Resilience vs. Protectionism / Uncertainty vs. Risk: Exploring the definitions of resilience and protectionism and the trade-off between economic rationality and defensive measures. Discussing the role of uncertainty in industrial policy.
- Knowledge of Supply Chains: Emphasizing the importance of data, knowledge, evidence, and foresight in managing supply chains and calling for cooperation between the public and private sectors.
- Other: Discussing short-term decisions affecting long-term visions, the need for granular information in policymaking, and concerns about future pandemics and climate change.

5.3. How are nations responding to those risks?

Overview

As previously mentioned, one major trend discussed was the focus on restructuring existing supply chains, with an emphasis on enabling domestic suppliers and increased resilience in an increasingly destabilised global landscape. Protectionism is prevalent as countries tend to protect the same industries which in turn poses challenges for market-led approaches. There is a notable lack of collaboration in response to China, with many nations reacting individually rather than fostering cooperation. The overall drive for resilience was identified as one of the most significant factors, with national self-sufficiency being a primary key driver of industrial innovation policy. Though this approach was understood, concerns were raised about the potential negative consequences, such as the risk of evaporating collaboration and compromises.

The global policy trend reflects increased state support, with China, the US, and the EU setting the tone. Neoclassical economists' opposition to industrial policy is noted, but the practical realities of state intervention appear to have overtaken theoretical objections.

The mission-oriented policy approach is also on the increase, discussants emphasising that industrial policy is not just for industries but for the people. Inequality should be a central consideration, and policies should support industrial transformation while providing people with the capacity to manage this transformation. The need for a holistic approach grounded in various policy areas, including competition, education, sustainability and employment was a common theme across the tables.

Participants also explored technology and sector focus, with examples of direct policy actions cited such as China establishing a new department for AI enablement. Many nations are adopting or continuing technology and sector focuses though as previously identified most nations are picking the same ones, in essence we are all competing for the same space. Vertical integration challenges, especially in critical sectors like batteries, were acknowledged. The importance of experimentation, risk-taking, and the need for more efficient systems were also highlighted as required for policy success.

Despite the shift towards increased nationalism, it was observed that some countries, like Korea, continue to champion the importance of collaboration in R&D and forging partnerships. However, challenges are noted, such as the undermining of global institutions like the WTO by the US. The importance of policy complementarity for smaller countries and the need for longer-term planning, as seen in China and Singapore's 20-year tech plans, were also discussed.

National responses in terms of effective policymaking practices seemed less evident with a continuing lack of the necessary integration of skills and expertise into industrial innovation policy. Similarly, participants, cognisant of election cycle challenges in industrial policy, did not see significant progress in nations successfully establishing the necessary mechanisms and culture

needed for longer term planning with the stability it brings in nations such as China and Singapore.

Highlights by Group

Group 1.

- Trends such as near-shoring, short-shoring, and re-shoring are noted.
- China is establishing a new department for AI enablement, focusing on domestic suppliers through a dual-cycle approach.
- Mission-oriented policy approaches are gaining traction in some countries.
- Industrial policies must go beyond sectors and encompass various areas like competition, education, inequality, and sustainability.

Group 2.

- Consideration of the impact of sovereignty on growth and the need for vertical integration.
- Discussion of policy instruments, including subsidies and public procurement as critical tools.
- Challenges of running innovation policy alongside legacy sectors.
- Calls for balancing national and global priorities and making strategic choices about sectors to support.
- Recognition of the importance of internationalizing R&D efforts.
- Acknowledgment of capacity limitations at government and institutional levels.

Group 3.

- Long-Term Planning and Stability: Some nations are focusing on longer-term planning (e.g., 20-year tech plans) to provide stability for future technologies, contrasting with election cycle-driven strategies.
- Regional Specialization and Institutional Frameworks: Acknowledging the influence of historical institutional frameworks, regional specialization, and governmental structures in shaping industrial policy responses.

Group 4

- Countries are diversifying their industrial policies to adapt to changing global trends.
- Many nations are shaping their policies in response to China, leading to a focus on reaction rather than collaboration.
- Developing economies are forging new partnerships, and some areas are witnessing flourishing collaboration.
- There is an increasing emphasis on experimentation and risk-taking, with governments exploring new technologies.
- Efforts to create more efficient systems, such as in energy, supply chains, and bureaucracy, and simplification strategies to reduce red tape are being pursued.
- There is greater integration between industrial policy, foreign policy, and resilience policy, with a departure from assumptions of open markets.

Group 5.

- Integrating Skills into IIP: Examining the integration of skills into industrial policies, vocational training, and the need for skilled workers to operate technology.
- Other Countries: Considering responses to global industrial policy trends in countries like India, Africa, the Middle East, and the potential for other nations to industrialize.

- Other: Discussing uncertainty related to climate change and natural disasters compared to

5.4. How do we balance national and global industrial innovation policy priorities?

Overview

The need for reforming the world order was addressed with recognition of the weakening of UN and WTO rules. Despite national-level analyses, discussions advocated supranational collaboration to address global challenges, highlighting the necessity for collective learning and a more connected global conversation.

Considering the global landscape, highlights included Korea's independent stance, the collaborative alignment of the EU and the UK, and the unique case of Norway's links to the EU. The need for reform in institutions, particularly in how financial institutions value and manage risks, was a common theme as was an acceptance across the meeting that our perspective needs to extend to include developing countries and consider global industrial policy beyond the developed world, with a focus on major players like Africa.

Collaboration was a recurring theme, urging honesty about competitive advantages, coordination, and more transparent global conversations. The power of the private sector and the role of companies in serving national interests was clear though there was wide advocacy for regulations to control the monopolization by large multinational companies.

The importance of accurate knowledge and data arose in a number of different contexts. It was accepted that universities play a key role in spurring innovation, however a more interconnected approach between academia and industry is still a shared priority.

The equality/inequality aspects of industrial policy were a common theme across the morning and any balance between national and global priorities would have to address these both domestically and internationally. With the potential to lift countries from poverty but also to exacerbate global inequality the push for a green transition was cited as an example of the risks and critiqued for potentially leaving developing countries and domestic low-income groups behind.

Highlights by Group

Group 1.

- The need for multilateralism is stressed, with a call for rules that enable fair competition.
- Reforming the world order, including international organizations like the UN and WTO, is seen as crucial.
- The fragmented nature of global collaboration in industrial innovation policies is highlighted, with discussions happening in various forums like G7 and G20.
- Addressing the power of large multinational companies and promoting competition are deemed essential.
- The rising influence of the private sector, especially in countries like China, necessitates demonstrating benefits to national interests.
- Collaboration among nations, including Asian countries like ASEAN, is encouraged to enhance cooperation.
- Norway's challenges in linking up with global actors and the potential impact of Brexit on EU collaboration are mentioned.

Group 2.

- Emphasis on building international collaborations based on an understanding of comparative advantage in innovation.
- Calls for expanding global industrial policies beyond developed nations, including Africa and other major players.
- Suggestions to be more honest about each country's competitive advantage and explore opportunities for coordination.
- Consideration of new trade policies and their potential impact.
- Recognition of the role of universities in fostering innovation and the importance of collaboration with industry.
- Calls for better coordination and dialogue between countries to understand global industrial policy trends.

Group 3.

- **Balancing Manufacturing and Service Sectors:** Recognizing the need for a balanced industrial policy that addresses both manufacturing and service sectors, considering employment and productivity implications.
- **Inequality Mitigation and Global Integration:** Advocating the use of industrial policy to mitigate domestic inequality and calling for a global approach to integrate developing countries into the global economy for stability and shared progress.
- **Collaboration in the Absence of Global Order:** Encouraging collaboration among like-minded states when a global order is lacking, emphasizing resilience over complete self-sufficiency.

Group 4.

- Balancing national and global industrial policy priorities involves addressing the overfunding of specific industries, such as clean energy, at the expense of a comprehensive industrial strategy, which can lead to inefficiencies and overproduction.
- Global antagonisms can complicate the balance between national and global priorities.
- Differing perceptions of evolving consumer realities in response to climate pressures can lead to varied industrial policy approaches.
- While primarily national priorities exist, trade blocs play a stabilizing role in balancing these priorities.
- The need for increased transparency and trust in global supply chains is emphasized to address these challenges.

Group 5.

- **Getting Time Horizons Right:** Addressing the challenge of aligning time horizons in industrial policies.
- **Chance for Industrializing Countries:** Exploring whether emerging industrial policies present a second chance for countries like India and Mexico to industrialize.
- **Standards:** Discussing the role of standards, particularly in telecommunications, and their impact on industrial policy.
- **China:** Investigating how China is building its own institutions, influencing global standards, and participating in international organizations and agreements. Also, raising concerns about subsidies in industrial policies and the role of the World Trade Organisation (WTO).

6. Session 4 – Sharing and improving policy practice (roundtables)

The second roundtables session focussed upon the process of policymaking structured around four key themes that had been identified through the earlier examination of industrial innovation policy practices across ten nations by The Babbage Forum.

6.1. Policymaking competencies

The key takeaways included the significance of common language, taxonomy, and a shared understanding of what constitutes good policy. The avoidance of unrealistic expectations and the need for multidisciplinary competencies are crucial along with proper recognition of the connection between policy and politics.

Discussants were clear that successful policymaking involves a mix of skills within government agencies, including economics, engineering, and scientific expertise. It benefits from a combination of generalist and specialist knowledge, both internal and external though even when the necessary knowledge is available there are challenges of technical expertise in isolated silos, lack of mobility across government departments, a total lack of expertise and data in some areas and a total reluctance from certain industries to share data.

To improve industrial policy, it was argued that a new skill set is required, especially for sectors other than defense. Building this skill set necessitates an education system capable of nurturing it, to include the development of an academic discipline and specific graduate programs focused on industrial policies. Policymakers should possess skills in analysis and a mix of economic and social science expertise and an overall lack of diversity in policymaking was a concern.

Ineffective policymaking is commonly characterised by siloed decision-making, insufficient data, inadequate attention to scale-up challenges, and, as mentioned by one participant, when under a democracy with the resulting lack of long-term policymaking that results. The selection of adequate personnel can be challenging with a shortage of institutions and experts to educate policymakers on industrial innovation. EU laws dominating regional and national policies were referenced as was an acknowledgement that many nations have the need for a more active industrial policy but lack the necessary capacity.

Institutional memory and learning from failures is essential for policymaking improvement though a balance between continuity and flexibility in policymaking is required. Collaboration across departments as well as between government, industry, universities, and think tanks is necessary and often an area of poor performance.

Highlights by Group

Group 1.

What Works:

- In Canada, policymaking begins with extensive consultation with industry and stakeholders. "Tiger" teams, consisting of officials from various areas, are formed to work on specific policies.
- Expert Commissions in Canada engage academia, industry, and others to address various topics like energy and climate-friendly investments.
- Korea maintains a close relationship between academia and government policy, resulting in minimal time lag in policy implementation.
- China's Development and Reform Commission plays a crucial role in policymaking, representing both development and reform.
- Extensive training programs exist for government officials in China.

- "Red-teaming" is employed to have high-level and junior-level civil servants collaborate effectively.
- Wide advising systems bring together experts from different fields and policymakers, enabling specialized advisory and criticism.

What Does Not Work:

- Lack of diversity in policymaking is a concern.
- The selection of adequate personnel can be challenging.
- There is a shortage of institutions and experts to educate policymakers on industrial innovation.
- Italy as an example faces constraints due to EU laws dominating regional and national policies.
- Like many other nations Norway acknowledges the need for a more active industrial policy but lacks the necessary capacity.

What Is Needed:

- Learning from failures is essential for policymaking improvement.
- Collaboration and diversity in teams are crucial for better policymaking.
- Access to data is vital for informed decision-making.
- Policymaking needs to extend beyond lawyers and embrace a broader range of competencies.
- Implementing AI in public administration can enhance efficiency and policy experimentation.
- A balance between continuity and flexibility in policymaking is required.
- Closer collaboration between government, industry, universities, and think tanks is necessary.
- Addressing heavy workloads of civil servants to allow for innovative thinking is essential.

Group 2.

What Works:

- Successful policymaking involves a mix of skills within government agencies, including economics, engineering, and scientific expertise.
- It benefits from a combination of generalist and specialist knowledge.
- Examples from the UK show the effectiveness of sector councils in convening diverse expertise from business and academia.
- Effective policymaking also requires breaking down silos and promoting communication across boundaries.

What Does Not Work:

- Ineffective policymaking is characterized by siloed decision-making.
- Insufficient data for decision-making
- Inadequate attention to scale-up challenges
- Frequent turnover among policymakers, resulting in the loss of expertise.

What Is Needed:

- To improve industrial policy, a new skill set is required, especially for sectors other than defense.
- Sufficient and effective education systems for policymakers.
- Policymakers should possess skills in analysis and a mix of economic and social science expertise.

Group 3.

What works:

- Successful industrial policy experiences were noted to originate from individuals with backgrounds in engineering and science, as opposed to lawyers and economists.
- The implementation of policies over theoretical considerations.
- The ability to break down complex ideas for policymakers and politicians through effective communication.
- Leveraging external competencies and attracting a diverse mix of individuals with various skills were deemed necessary for policymaking.

What does not work

- Pure economics was considered less important than common sense in policymaking.

Group 4

What Works:

- Effective consultation methodologies for interfacing across the ecosystem.
- Utilising history as a reference point.
- Employing appropriate techniques such as dialogue techniques and systems theory.

What Does Not Work:

- Narrow perspectives, whether driven by ideology or a single-firm viewpoint.

What Is Needed:

- Development of an academic discipline focused on industrial policies.
- Specific graduate programs dedicated to industrial policy.
- Balancing government and private sector roles.
- Coordination mechanisms across ministries for policy coherence.

Group 5.

What Works:

- Institutional memory and continuity are essential for successful policymaking.
- Task force examples during crises like Covid in the US and UK.
- Singapore's model of a loyal civil service with job rotation.
- Government convening to facilitate collaboration between sectors and actors.

What Does Not Work:

- Technical expertise in isolated silos.
- Lack of mobility across government departments, leading to reinventing the wheel.
- A total lack of expertise and data in some areas.
- Reluctance from certain industries to share data, such as patents.
- Relying solely on lobbying for information.

What Is Needed:

- Enhanced technical expertise and understanding of supply chains.
- A granular understanding of production processes and supply chains.
- Balance between technical competencies and social acceptance.
- Strong civil service with key capabilities and expertise.
- Institutional memory and continuity
- Vertical and technical knowledge

6.2. Managing policymaking ecosystems

Effective management of ecosystems requires long-term stable political leadership. A professional civil service is crucial, and political appointments can disrupt this stability. Successful coordination mechanisms, such as the US OSTP or the CSTI council in Japan, contribute to effective bureaucratic and political collaboration. Creating consortiums, developing policies based on identified needs rather than one-off solutions, and fostering public-private coordination with industry buy-in (e.g., UK's Automotive Council, Italy's Emilia Romagna) are proven strategies.

Strong bottom-up participation, formed through partnerships between the business community and regional entities, enhances ecosystem management. Ongoing conversations between academics and industry, recognizing that there are no academically correct answers, facilitate a deeper understanding of each other's motivations. In Norway for example, inter-agency coordination, involving ministries, agencies, and directorates, contributes to efficient policy execution and revision every 4-5 years.

China employs both formal and informal systems for consulting in policymaking, involving national and provincial levels, think tanks, and advisory boards. In France, a consensus forum addresses conflicts of interest related to climate change tradeoffs, establishing a sound democratic basis. Italy's Bologna showcases successful agencies involving multiple stakeholders with ongoing discussions about goals, tools, and results.

In the UK, incentives and clear targets, such as the Olympics, COVID response, and outsourcing to the private sector have driven successful ecosystem management. Japan occasionally establishes ad hoc councils to incorporate academic and business views into specific policy issues.

Political cycles disrupting mid- and long-term policy can be detrimental. In some countries, administrative changes align with political shifts, disrupting stability. However, the counterpoint is that political flexibility in democracies can foster innovation.

Korea highlights the lack of a well-established advisory system for industrial innovation policy, hindering effective management.

A culture encouraging collaboration across departments and positive examples, like the US Warpspeed initiative, is essential but elusive. Establishing new organisations that bring senior people from different agencies together can foster innovation, as seen in Italy's coordination between and across regions.

There is a need for not just bureaucratic but also political order, with someone consistently dealing with strategic issues. Coordination leadership skills, a coordinator for interagency collaboration, and regional ecosystem considerations are crucial. Good industrial innovation policy requires insights from both industry and academics, involving a mix of "foxes and hedgehogs."

Highlights by Group

Group 1.

What Works:

- Professional civil service plays a significant role in effective policymaking.
- Inter-agency coordination and information exchange, as seen in Norway, are important.
- Regular reporting on the state of the nation/government, such as White Papers, is beneficial.
- Interministerial coordination in long-term planning fosters innovation.

- Formal and informal systems of consulting for policymaking, involving various levels of government, think tanks, and universities, are effective.

What Does Not Work:

- Lack of coordination between organisations and a poorly established advisory systems hinder industrial innovation policy.

What Is Needed:

- Democracies' flexibility in leadership and policy changes can encourage innovation.
- Policymakers require insights from both industry and academia.
- A robust advisory system with diverse expertise is necessary.

Group 2.

What Works:

- Effective management of policymaking ecosystems involves promoting a culture that encourages collaboration across government departments and regions. Positive examples include Operation WarpSpeed in the United States and coordination efforts in Italy.

What Does Not Work:

- Inefficient management is marked by a lack of coordination between agencies, a failure to coordinate across regions, and boundaries between departments hindering decision-making.

What Is Needed:

- Policymakers should focus on coordinating efforts with regional ecosystems and specifying the rules governing innovation systems.
- Cultivating a culture that supports cross-departmental collaboration is essential.
- Models such as Operation WarpSpeed and new engagement strategies with academia can serve as inspiration.

Group 3.

What works:

- A multifaceted approach.
- Preparing for changes such as AI and technology standards, creating consortiums, and promoting ongoing discussions between academics and industry.
- Consensus forums for addressing conflicts of interest and clear incentives with targets were also highlighted.

What does not work

- Political cycles that restart approaches to industrial innovation policymaking.

What Is Needed:

- Advocacy, risk-taking capacity, technocratic elements in policymaking, awareness of global impacts, executive agencies with authority, and new tools for policy continuity.
- Synthesis and visualisation of ecosystems and engagement with startups and minor players in policymaking.

Group 4

What Works:

- Strong bureaucratic and political coordination mechanisms like the US OSTP or CSTI council in Japan.
- Ad hoc councils to incorporate academic and business views into policy issues.
- Coordinators with interagency management skills.

What Does Not Work:

- Insufficient power and knowledge for coordinators.
- Lack of industry experience among policymakers.
- Ineffective policy coordination mechanisms.

What Is Needed:

- Political as well as bureaucratic order.
- Leadership in coordination.
- Geographical context consideration in industrial policies.

Group 5.

What Works:

- Strong bottom-up participation forming partnerships between the business community and regional governments, as seen in the Emilia Romagna region.

What Does Not Work:

- Lack of coordination between ministries and agencies responsible for industrial policy

What Is Needed:

- Coordination leadership skills.
- An executive agency with the authority to deliver innovation policy.

6.3. Evaluation and policy learning

Effective policy evaluation and learning are crucial components of successful governance. Early consideration of evaluation design is essential to ensure the collection of relevant data and the adoption of the right approach, with an understanding that corrections become challenging later in the process.

Diverse accounts, including academic papers and journal articles, provide insights into what went wrong or right and a combination of qualitative and quantitative data was advocated for a comprehensive understanding. Establishing a governance structure, exemplified by the Industrial Policy Council, enhances coordination and effectiveness.

In countries like China and the UK, systematic tools and annual reviews are employed to assess policies. Both nations have developed structured approaches, such as China's guidance to different levels of government and the UK's Formulaic system with the Green Book and Magenta Book.

Canada relies upon the role of evaluation units in each department, designed to ensure accountability to parliament whilst Italy and Germany have established central control systems to measure results against program objectives.

Singapore illustrates the value of institutional memory and legacy learning with examples such as SARS, whereby integrating expert insights into future strategies, an effective process for dealing with future pandemics was created. Additionally, emergencies, like the response to COVID, often lead to consensus on unpopular policies, showcasing the adaptability of policymaking during crises though learnings are not necessarily taken through to standard practice. Public trust is deemed essential, as seen in Singapore, where trust is considered more critical than technical competencies.

It was noted that expectations from evaluations can be unrealistic, often not recognizing the limitations of methodologies. Bureaucratic burdens can arise, absorbing excessive resources, as seen in the UK's experience with metric-based evaluations and the challenge of breaking free from a continuous cycle of routine ("hamster wheel") were noted issues.

Short-term evaluation horizons, especially in democracies, and the dichotomy between success and failure without considering uncertainties pose challenges. Balancing diverse objectives is difficult, requiring a nuanced approach and though Data-based design is crucial for effective evaluation, data collection can itself become siloed. Information asymmetry between the public and private sectors in particular needs addressing, with a call for improved information sharing and synchronized language across programming for comprehensive data evaluation.

Establishing clear objectives, independent evaluations, and transparency in evaluators are considered essential. Evaluations are sometimes used to justify spending rather than objectively assessing outcomes so clear frameworks for measuring industrial policy effectiveness (KPIs) need to be employed.

Learning opportunities for policymakers from abroad should become more routine, institutional learning should be made accessible to the public, and evaluation methodologies should consider the regional context. and effective models reliant on professional skills are required. Special attention to aggregation issues, understanding interrelationships between ongoing programs, and ensuring comprehensive data sharing across sectors are crucial.

Tolerance for experimentation, acceptance of uncertainty, and the incorporation of risk management principles should be far more widespread as all too often failure is feared rather than embraced as part of an iterative or learning process.

Highlights by Group

Group 1.

What Works:

- A formulaic system with clear objectives and evaluations, such as the Green Book and Magenta Book, is effective.
- Annual reviews of policies, suggestions, and criticisms enhance policymaking.
- Improved use of data, including web scraping for identifying skills gaps, contributes to better policymaking.
- Canada's evaluation units in each department ensure accountability to parliament.

What Does Not Work:

- Difficulty breaking out of the "hamster wheel" of routine policymaking.
- Uncertainty regarding responsibility when implementing AI in policymaking.
- Limited time and resources for thorough evaluation and learning.
- The lack of attention to learning from mistakes and experiences in industrial strategy development.

What Is Needed:

- Making government evaluation knowledge available to the public to promote institutional learning.
- Establishing clear key performance indicators (KPIs) for measuring industrial policy success, considering factors like patents, wages, workforce participation, and emissions.

Group 2.

What Works:

- Effective evaluation strategies consider both public and private sector resources, encompassing outcomes, processes, and impacts.
- Pilot schemes that allow experimentation and a culture that tolerates failures

What Does Not Work:

- Balancing objectives and outcomes can be challenging, and ex ante evaluation is often cost-prohibitive.
- Evaluation is often done on too short of a time horizon when many policies necessitate long-term perspectives.

What Is Needed:

- Policymakers should focus on measuring and evaluating the outcomes, processes, and impacts of policies.
- They should also consider indirect outcomes and uncertainties, moving beyond a binary success/failure.

Group 3.

What does not work

- Emergencies can lead to consensus on unpopular or ineffective policies.
- The effectiveness of cost-benefit analysis
- A lack of capacity for implementation.
- Different agendas among policymakers.

What Is Needed:

- Policymakers require a higher risk tolerance, systems thinking and the integration and acceptance of uncertainty.
- Implementation operational excellence, the right KPIs for policymaking.
- The habit of learning from other countries' policymaking experiences.

Group 4

What Works:

- Early design of evaluation processes to ensure data collection aligns with objectives.
- A mix of qualitative and quantitative data.
- Alternative evaluation approaches for certain programs.
- Understanding aggregation and interrelationships between programs.
- Improved data systems and sharing.

What Does Not Work:

- Unrealistic expectations from evaluations.
- Overly bureaucratic evaluations.
- Failure to apply learning from evaluations due to political constraints.

What Is Needed:

- Context-specific evaluation methods.
- Longitudinal data for public assessment.
- Information sharing between public and private sectors.
- Common language and data standards for evaluation.

Group 5.

What Works:

- Multiple accounts of what went wrong and right.
- Acknowledging that all policies involve some level of experimentation.
- Implementing a governance structure like an Industrial Policy Council.
- Building and maintaining public trust.
- Learning from past experiences, such as Singapore's response to SARS.

What Does Not Work:

- A lack of public trust in policymaking.
- Impact assessments are often lacking.

What Is Needed:

- Audits with an auditing trail.
- Measuring resilience and addressing high uncertainty.
- Independent review with clear objectives and transparency.

6.4. Industrial Capability Characterisation

Successful industrial capability characterisation relies on strategic approaches that envision long-term technological developments. For instance, Korea's foresight in envisioning the future motor industry, even in the absence of adequate infrastructure like roads. Leveraging private sector signals, as exemplified by Tesla's success, is another successful approach, with China utilising a Tesla joint venture to accelerate its domestic supply chain.

Gathering intelligence from the private sector is crucial, and dedicated government spaces, such as the chips office focusing on the semiconductor value chain, play a pivotal role in understanding industrial dynamics.

Countries like Korea assess capabilities through various metrics, including patents, scientific articles, and expert interviews. The UK addresses the challenge with the support of academia as well as using specific metrics such as the number of robots in different sectors. Identifying and addressing grand challenges or key technologies, like AI and big data, helps countries understand future demand and their capabilities to meet that demand. Italy employs a unique approach by creating "pictures" or "maps" of industrial systems, characterising each province by industries. The success story of the automotive industry in the Emilia Romagna region is an exemplar of collaboration between industries, trade unions, and regional governments.

In the US, positioning within the supply chain and making decisions on which parts to produce or outsource are critical aspects of industrial capability characterisation.

Paying undue attention to unicorns was identified as a challenge, as it may not reflect the broader industrial landscape accurately. Consultancy reports may not always provide sufficient insights, and relying solely on statistical systems may not convey a comprehensive understanding of capabilities. Data collection without effective utilisation is also highlighted as a common risk with nations needing actionable insights.

A lack of granular understanding of supply chains, including both opportunities and challenges, contributes to path dependence. This was seen to be hindering efforts to improve industrial capabilities and in general there was a call for a more detailed characterisation of different stages of the innovation process, addressing the current aggregation challenges. There is a need for a more nuanced understanding with recognition that bottlenecks occur at different stages of the innovation life cycle. Identifying such bottlenecks necessitates a systems thinking approach with a capability to bridge quantitative and qualitative data. Furthermore developing new early metrics and datasets for emerging technological success is crucial to avoid self-fulfilling prophecies.

Understanding comparative advantages on a national level requires standardised metrics for cross-country comparisons. Integrating skills, knowledge, and capabilities across sectors is essential for fostering a holistic industrial environment.

Geographical information systems provide valuable insights into local contexts, aiding in the formulation of targeted industrial policies. Establishing government-based organizations dedicated to analytics around key sectors and technologies helps answer critical questions related to industrial performance.

Highlights by Group

Group 2.

What Works:

- Effective characterization of industrial capabilities involves measuring factors such as the number of robots in sectors, assessing capabilities through patents, scientific articles, and expert interviews, and understanding bottlenecks in the innovation process.
- Comparative advantage among nations should also be explored.

What Does Not Work:

- Overemphasis on unicorns and aggregated assessments of innovation stages hinder effective characterization.

What Is Needed:

- Policymakers should unpack the innovation process, recognize the diversity of bottlenecks at different stages,
- Policymakers need to establish standards for cross-country comparisons and collect relevant data.

Group 3.

What works:

- Visioning for the long term, positioning within the supply chain,
- Extracting trend identifiers from the private sector
- Identifying future demand and capabilities.
- The adequacy of consultancy reports questioned.

What does not work

- Not every issue can be treated as a mission, and some issues lack consensus, hindering progress.

What Is Needed:

- Policymakers need to integrate skills, knowledge, and capabilities in new sectors.
- New early metrics, datasets for emerging technological success, identifying bottlenecks.
- Tailoring industrial policies when choosing technologies.

Group 4

What Works:

- Dedicated government units gathering data and understanding industry dynamics.

What Does Not Work:

- Relying solely on statistical systems.
- Collected data remaining unused.

What Is Needed:

- Integration of quantitative and qualitative data.
- Utilization of geographical information systems.
- Government-based organizations conducting analytics on key sectors and technologies.

Group 5.

What Works:

- Collaboration between industries and trade unions.
- Incorporating scientists into policy-making processes.
- Public-private cooperation and industry buy-in for specific projects.

What Does Not Work:

- A lack of public trust in policymaking.
- Impact assessments are often lacking.

What Is Needed:

- Multiple accounts of what went wrong and right, rather than relying on a single official document.
- A granular understanding of supply chains, opportunities, and challenges.
- Access to data, especially on supply chains.

7. Session 5 – Developing and delivering industrial policy (plenary)

The final plenary session invited participants to either make additional contributions or to reflect on the day's proceedings. Emerging themes included:

Tools and techniques

A number of countries shared tools and techniques which had proved to be useful. They included China's approach to understanding supply chain decoupling through an analysis of network bottlenecks and Singapore's development of 'transition maps' to guide comprehensive sectoral policies. The opportunity to compare notes about specific practices in different countries was widely appreciated.

Funding

Many nations are implementing industrial policies which involve substantial levels of public investment. It was noted that few, if any, countries were likely to be able to maintain investment at high levels and this had implications for future policy options.

Progress and risks

There was much evidence of more active industrial policy in many nations. Concern was expressed, however, that such policies implied economic trade-offs. It would be important to monitor carefully the social implications of the new approaches and to avoid the errors of earlier periods of industrial policymaking.

Bridging policymaking silos

Many countries wrestle with the challenges of co-ordination across government departments and agencies. This was thought to be an area where a sharing of expertise and experience would be particularly valuable. There were seen to be opportunities for international co-operation to jointly explore the creation of new co-ordination and implementation mechanisms.

Evaluation

Evaluation is a feature of most policymaking activities but the accumulation of policy learning varies widely. It was noted that comprehensive databases with evaluations that can be drawn upon by others dealing with sectoral or widespread industrial strategies would be a valuable resource. Such a resource would capture the history and outcomes of policy implementations.

Education and skills

Education and workforce development as integral parts of an innovation system were highlighted. Equally important, however, is the education of industrial innovation policymakers to tackle the long term, multidisciplinary challenges posed by industrial innovation policymaking.

The role of industry

Recognition of the renewed interest in industrial innovation policy globally underpinned the meeting. Ultimately it is companies, from start-ups to large corporations, that bring products to markets. While large industries have typically had ready access to policymakers, smaller companies find this much more difficult. Similarly, policymakers typically find it difficult to access, understand and influence smaller businesses. A stronger industrial voice should be a feature of future deliberations.



BABBAGE FORUM



The Babbage Forum is part of Cambridge Industrial Innovation Policy

Institute for Manufacturing
17 Charles Babbage Road, Cambridge UK, CB3 0FS
+44 (0)1223 766141
ciip.group.cam.ac.uk