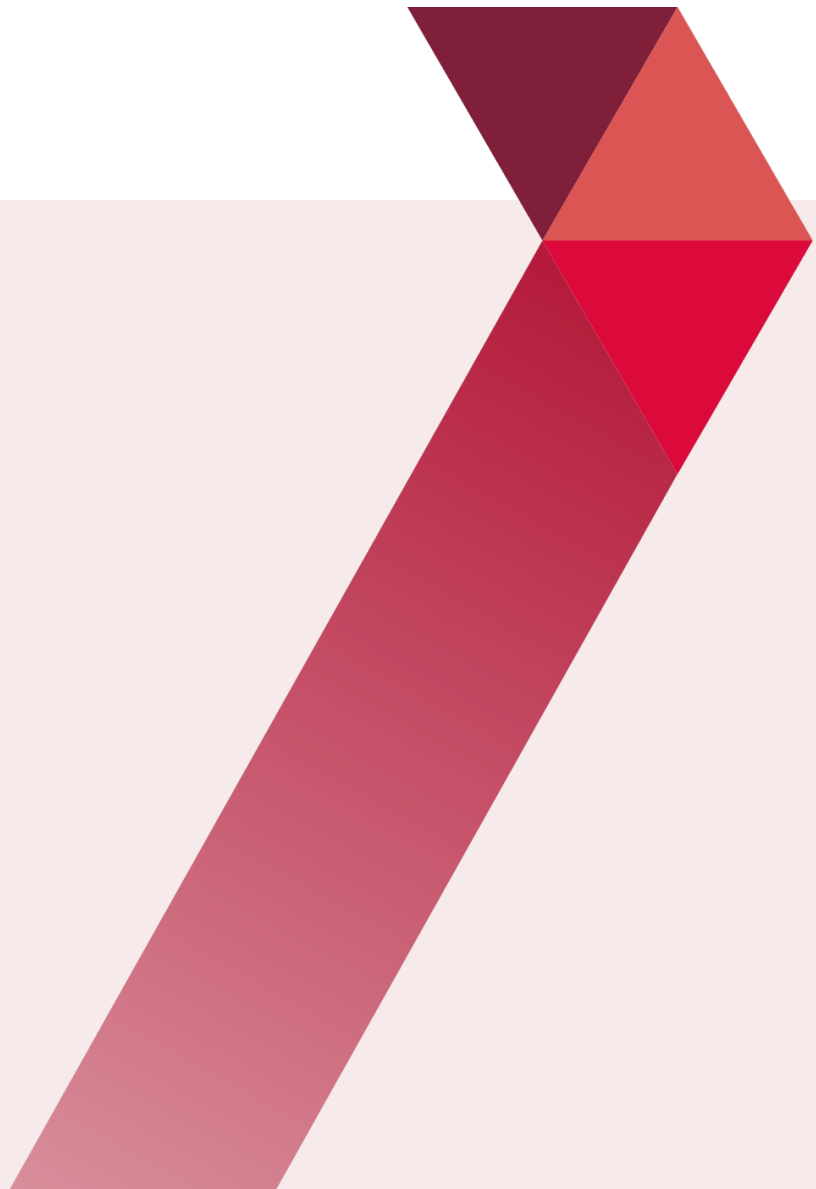


Sector plans: why they matter and how to deliver them effectively

A response to the UK Government's Industrial Strategy Green Paper

CARLOS LÓPEZ-GÓMEZ, MATEUS LABRUNIE, ZONGSHUAI FAN

Cambridge Industrial Innovation Policy (CIIP), Institute for Manufacturing, University of Cambridge



About this response

The authors welcome the opportunity to contribute to the UK Government's Industrial Strategy Green Paper consultation. The views and opinions expressed in this note are those of the authors and contributors alone and do not represent the positions, strategies, or endorsements of any organisations, institutions, or affiliated bodies. **This note is based on the response submitted to consultation questions 1, 3, 34, 35, and 36.** It has been structured in a format designed to enhance readability and accessibility, differing from the official submission template.

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IfM Engage, 17 Charles Babbage Road, Cambridge, CB3 0FS, the UK

www.ciip.group.cam.ac.uk

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1. Summary of the argument

SECTOR PLANS – WHY, WHAT, AND HOW

- **There are compelling reasons to adopt a sector-based approach to promote economic growth.** Economic conditions, such as size, market structure, and investment levels, vary significantly across sectors. Sectors also contribute differently to national strategic goals, with some playing pivotal roles in areas like economic growth, national security or net-zero ambitions. Additionally, sector-specific evidence enhances the design of horizontal policies, allowing for more targeted and effective interventions. Businesses naturally organise themselves by sectors, as seen through industry trade associations, which facilitate collaboration between government and industry. Lastly, international examples – ranging from Taiwan’s semiconductor success to Singapore’s biopharma growth – underscore the effectiveness of sector strategies in driving industrial transformation.
- **The evidence generated by sector plans is crucial to inform and shape industrial strategy decisions.** Sector analyses provide a detailed understanding of how policies address barriers to growth and help design more nuanced interventions.
- **Sector plans and missions are complementary elements of an effective industrial strategy.** Far from being substitutes, missions rely on strong sectoral and technological systems to succeed.
- **Rather than the government independently developing sector plans, a process should be established to enable the joint public-private development of the sector plans with industry and other sectoral stakeholders.** Industry plans should be both government- and industry-led, ensuring its alignment with broader national objectives and industrial innovation capabilities. They should involve bottom-up participation of a broad range of stakeholders to agree on a shared ambition for growth and innovation. The government must also be wary of not focusing too much on the interests of a few influential stakeholders, neglecting the needs of smaller ones or those that do not yet exist. The ideal relationship is well encapsulated in the concept of “embedded autonomy,” which describes a situation in which the government works close to industry and society, but still retains its autonomy and is not captured by interest groups.
- **Sector plans should establish concrete value-added and export growth targets to improve the UK’s competitiveness performance.** Some UK sectors and subsectors have become less competitive and lost global market shares over the last two decades. Reversing this trend should be at the heart of sector plans.
- **Sector-specific studies are essential to effectively underpin sector plans.** The evidence base required for effective sector plans include value chain analyses to map the sector structure and identify key high-value-added subsectors, strategic foresight exercises to anticipate future trends and disruptions, and sector competitiveness studies to assess the UK’s strengths, weaknesses, and opportunities in the global market.
- **There are opportunities to learn from international experience on sector plans.** While the specific needs of each sector can only be determined through a robust evidence base, several recent initiatives in leading industrial countries provide insightful examples of the diverse analyses, objectives, and implementation strategies that can shape effective sector plans. At the very least, these initiatives provide insights into the actions and strategies being employed by the UK’s competitors.

2. Sector Plans – Why

A sector-based approach offers unique advantages to fostering economic growth. The industrial strategy green paper rightly identifies the potential of sector plans to support policy development and prioritisation. While horizontal policies, such as regulatory frameworks and intellectual property protection are critical components of industrial strategy, their impacts often vary significantly across sectors. For example, horizontal policies like R&D tax credits tend to benefit sectors such as pharmaceuticals significantly, where companies may allocate over 20% of their revenue to R&D, in contrast to only 5% or less in other sectors. As highlighted in **Box 1**, adopting a sector-specific approach can help address these nuances and maximise the effectiveness of industrial strategy.

The evidence generated by sector plans is crucial to inform and shape industrial strategy decisions. Sector analyses provide a detailed understanding of how policies address barriers to growth and help design more nuanced interventions. The evidence base for Sector Plans should provide policymakers with reliable insights to engage constructively with the private sector, balancing legitimate industry interests while avoiding undue bias towards incumbent firms and technologies. They can also help policymakers weigh trade-offs when the interests of specific firms or sectors do not align with the broader public interest. Importantly, a comprehensive sector plan evidence base can highlight areas where government intervention may not be necessary, ensuring that resources are directed to where they can have the greatest impact.

Sector plans and missions are complementary elements of an effective industrial strategy. Far from being substitutes, missions rely on strong sectoral and technological systems to succeed. As David Willetts has cautioned, there is a risk of missions becoming overly vague, potentially serving as a way to sidestep critical decisions, or being misinterpreted as eliminating the need for investments in foundational science and technology. “Without rocketry capabilities, the Apollo Moon programme would have not had much hope.”¹ Ultimately, the success of missions in driving significant progress and innovation fundamentally depends on solid sectoral and technological foundations.

¹ UCL Commission for Mission-Oriented Innovation and Industrial Strategy. May 2019.

Box 1. Why Sector Plans make sense

There are compelling reasons to use a sector-based approach to promote economic growth:

1. Economic conditions vary significantly across sectors

- Sectors differ in size, firm diversity, market structure, export orientation, and research intensity, among other aspects.
- Investment levels and timeframes for earning returns also vary across sectors. For instance, R&D tax credits disproportionately impact sectors dominated by R&D-intensive firms.
- Certain sectors attract less venture capital due to longer product development cycles and larger capital requirements.

2. Sectors contribute differently to national strategic goals

- Some sectors, such as semiconductors and clean energy, are strategic for national security and socio-economic goals, warranting promotion beyond purely market considerations.
- Energy intensity differs by sector, necessitating varied levels of support to achieve net zero targets.
- Some sectors have regional footprints that need to be considered for the purposes of levelling-up. A sector perspective allows policymakers to identify areas where interventions can deliver the greatest impact on regional economies.

3. Sector-based evidence improves horizontal policy design

- Sector strategies and plans provide valuable insights into designing and implementing horizontal policies more effectively. By tailoring approaches to the unique needs and contributions of each sector, governments can maximise economic growth and align policies with national strategic priorities.

4. Businesses naturally organise themselves by sectors

- The prevalence of sector-specific trade bodies demonstrates how businesses naturally align within sectors.
- Sector engagement strategies enable governments to facilitate collaboration within industries to address shared challenges.

5. International experience highlights the effectiveness of sector strategies

- Global examples, such as semiconductors in Taiwan, software in Ireland, biopharma in Singapore, and salmon in Chile, illustrate the success of sector plans in diverse economies.
- Sector strategies are central to industrial policies in several countries today, including the U.S. Chips and Science Act, South Korea's Special Act on National High-Tech Strategic Industries, and Singapore's Industry Transformation Maps.

Source: Authors' elaboration based on [Malerba & Adams \(2013\)](#), [BEIS \(2012\)](#).

3. Sector Plans – What

Sector plans are frameworks of strategic intent. They provide an agreed vision of the sector, supporting alignment, integration, synchronisation, consensus, decision-making, actions, and resource allocation.² It ideally provides a detailed description of the current state of the sector, a diagnostic of existing issues, analyses of ongoing and future sectoral trends, identification of areas of strategic interest, objectives for the future of the sector, the actions required to achieve them, and the stakeholders involved.

Each sector plan needs to carefully draw the boundaries of the industrial system that it seeks to influence. Traditionally, sectors were seen as distinct from one another based on the specific goods and services they produced, as well as the technologies and processes used in their production.³ However, the boundaries between sectors have increasingly blurred due to factors such as the cross-cutting nature of certain technologies, the rise of outsourcing and global value chains, and the bundling of goods and services.⁴ This highlights the need to see sectors as dynamic systems encompassing interdependencies between groups of firms, technologies, and capabilities. In practice, this means that rather than limiting sector plans to firms within traditional industry classifications, a flexible approach is required based on more sophisticated sector representations that account for the structure of the supply chain and key dependencies with other sectors.

Sector plans should establish concrete value-added and export growth targets to improve the UK's competitiveness performance. As shown by the UK Innovation Report,⁵ produced by Cambridge Industrial Innovation Policy, some UK sectors and subsectors have become less competitive and lost global market shares over the last two decades. Reversing this trend should be at the heart of sector plans. Establishing concrete value-added and export growth targets can help communicate and focus efforts. These should be set out comparing the performance of UK sectors with those of international competitors.

For specific advanced manufacturing sectors, examples of goals established in sector plans include the following:

- **China**
 - **Robot industry:** over 20% annual growth of the income in the robot industry by 2025 (Source: [Development plan for the robot industry during the period of the 14th five-year plan \(2021-2025\)](#), issued in 2021)
 - **Automotive:** sales of new electric vehicles (EVs) to account for 20% of total new vehicle sales by 2025 (Source: [Development plan for the EVs industry \(2021-2035\)](#), issued in 2020)

² Adapted from Kerr and Phaal (2022) Roadmapping and Roadmaps: Definition and Underpinning Concepts.

³ Von Tunzermann and Acha (2005). Innovation in 'low-tech' industries. In The Oxford Handbook of Innovation.

⁴ Hauge, J. and O'Sullivan, E. (2019). Inside the black box of manufacturing: Conceptualising and counting manufacturing in the Economy. Report prepared for the UK Department for Business, Energy and Industrial Strategy. Centre for Science, Technology and Innovation Policy.

⁵ [UK Innovation Report](#) produced by Cambridge Industrial Innovation Policy.

- **Industrial machinery:** sales of electronic components to reach RMB 2100 billion (~US\$ 290 billion) and have 15 enterprises with more than RMB 10 billion (~US\$ 1.4 billion) of annual income (Source: [Action Plan for the Development of Basic Electronic Components Industry \(2021-2023\)](#), issued in 2021)
- **Korea**
 - **Bio economy:** increase Korea’s bio economy production and export value to USD 74 billion and USD 50 billion, respectively, by 2030. (Source: Bio Economy 2.0 Initiative, issued on 20 July 2023)
 - **Panel displays:** become the world’s top producer of panel displays by 2027. (Source: Invest Korea (2023). Korea’s Display Industry, Leading the Global Market and Technology with Next-Generation Display OLEDs)
 - **Batteries:** become the world leader of the secondary battery market by 2030 (Source: MOTIE (2023). Secondary battery industry innovation strategy).

Sector plans should address key policy questions related to industrial innovation, competitiveness and growth. The green paper emphasises growth and investment as the primary intended outcomes of the industrial strategy. As part of the definition of a theory of change, however, an explicit discussion of the relationship between these objectives and broader policy goals is required. As highlighted in the report “Why manufacturing supply chains matter and how to revitalise them,”⁶ produced by Cambridge Industrial Innovation Policy, such policy goals include: (a) improving productivity and competitiveness, (b) enabling the creation of well-paid jobs in a high-wage economy, (c) building an industrial base capable of scaling up emerging technologies, (d) fostering place and cluster competitiveness, and (d) guaranteeing security of supply. Box 2 lists some key guiding policy questions that sector plans should address.

⁶ [Why manufacturing supply chains matter and how to revitalise them](#). The role of supply chains in achieving socio-economic missions. Report for the Department for Business and Trade (DBT).

Box 2. Key guiding policy questions for sector plans (not exhaustive)

Factor inputs

- How competitive are the sector's input costs in the UK compared with competitor countries? How does this affect the cost structure of firms in the sector?
- What are the skills required in the sector, and how will they change in the future?
- What are the leading supply chain risks and vulnerabilities now and in the future?
- What are the drivers of competitiveness in the sector?

Sector performance

- What are the primary sources of value creation and capture in the sector?
- Where in the value chain are UK firms competing?
- What are the productivity figures compared with the global average and leaders?
- How has the global market share of the sector changed over the last decade?
- What are the main changes required to achieve Net Zero objectives?

Markets

- What are the international markets that the domestic firms are well-positioned to serve? What are the barriers to accessing such markets?

Drivers of change

- What trends and drivers (technological, market, regulatory, etc.) are expected to change all of the above?

Policy delivery

- What are the risks of regulatory capture, bias towards incumbent firms and technologies, and possible curbs on competition?
- What are the key policies implemented in other major countries, and how might they affect UK firms?

4. Sector Plans – How

Rather than the government independently developing sector plans, a process should be established to enable the joint public-private development of the sector plans with industry and other sectoral stakeholders. Industry plans should be both government- and industry-led, ensuring its alignment with broader national objectives and industrial innovation capabilities. They should involve bottom-up participation of a broad range of stakeholders to agree on a shared ambition for growth and innovation. However, the government must be wary of not focusing too much on the interests of a few influential stakeholders, neglecting the needs of smaller ones or those that do not yet exist. The ideal relationship is well encapsulated in the concept of “embedded autonomy,” which describes a situation in which the government works close to industry and society, but still retains its autonomy and is not captured by interest groups.

The evidence base required for effective sector plans cannot be derived solely from economic analysis or consultations with a narrow selection of firms. From the outset, it is important to recognise that necessary evidence for sector plans (including the evidence required for the identification of promising subsectors) is not readily available and that gathering it represents a significant undertaking. National statistics offices typically collect and organise data based on standardised sector classifications, adhering to international guidelines to ensure comparability across countries. While these classifications are critical for identifying trends and supporting administrative functions like taxation and business licensing, they have significant limitations. For instance, nearly one-third of UK companies are classified under one of the 74 Standard Industrial Classification (SIC) codes labelled as “other” activities, which obscures the nuances and dynamics of their economic contributions. Gathering evidence for sector plans should be a continuous process to incorporate both quantitative and qualitative insights derived from statistical analysis as well as extensive industry and technology expertise.

For reference, the sector studies that preceded the CHIPS Act were produced by a task force that convened more than a dozen departments and agencies and drew from consultations with hundreds of stakeholders, public comments submitted by industry and experts, and analytic research by experts from across the United States government. In Singapore, the Deputy Prime Minister clearly illustrated the challenge of developing sector plans: “There is a need for painstaking effort, industry by industry, to look at ways to redesign jobs and raise productivity, to upgrade skills, and establish better career progression for workers.”

Sector-specific studies are essential to effectively support sector plans. These studies should include value chain analyses to map the sector structure and identify key high-value-added subsectors, strategic foresight exercises to anticipate future trends and disruptions, and sector competitiveness studies to assess the UK’s strengths, weaknesses, and opportunities in the global market.

- **Value chain analysis.** The green paper rightly identifies the need for value chain analysis to identify key subsectors. These studies should ideally map out the sectoral systems that each plan seeks to affect and identify key high-value-added subsectors and the position of UK firms. As highlighted in Cambridge Industrial Innovation Policy’s report “Why manufacturing supply chains matter and how to revitalise them,”

⁷ the concept of the value chain complements that of supply chains by placing an emphasis on the processes of value addition alongside the set of activities involved in creating a product or service. This helps us to think about those activities that underpin the competitive advantage of firms and industries. A broad definition of a value chain would be “the interconnected set of firms and wider activities that together create the value added of the product”. These activities include research and development, design, logistics and after-sales services.

- **Strategic foresight and roadmapping exercises.** Crucial insights can be obtained from strategic foresight and roadmapping exercises to make sector plans future-oriented. These include analysis of future-looking data, such as publications and patents, and consultations with a broad range of innovation system actors, including existing firms, industry associations, academics, scientists and technologists. Japan’s experience is illustrative in this regard. With a long tradition of sector-focused foresight exercises, Japan employs roadmaps and Delphi studies with time horizons extending up to 50 years. These are regularly updated by specialised agencies staffed with technology and industry experts working closely with the private sector. Japan’s Ministry of Economy, Trade and Industry (METI) leverages technology roadmapping to understand future market trends, prioritise critical technologies, and promote cross-sector collaborations, such as partnerships between academia and industry or across different industries.
- **Sector competitiveness studies.** The studies should then analyse the drivers of UK competitiveness in the growth-driving sectors, including **cost competitiveness** (analysis of production costs, including labour unit costs, tax-related costs, energy costs, infrastructure costs, capital costs, intermediary consumption costs, costs implied by exchange rates, etc.) and **non-cost competitiveness** (innovation, qualified human resources, brands, IP, marketing, organisational structures, etc.). The report⁸ by the French government agency France Stratégie is an example of an extensive competitiveness study of the French industrial sector.

There are opportunities to learn from international experience on sector plans (Box 3).

While what each sector requires can only be identified by the evidence base, some interesting initiatives from recent international sector plans include the following:

- Data hub to monitor vulnerabilities (US IRA)
- Manufacturing institutes for production innovation focus (US CHIPS)
- Grants to retool existing factories (US IRA)
- The coordinating role of national economic council at highest levels of government (example: Singapore)

⁷ [Why manufacturing supply chains matter and how to revitalise them](#). The role of supply chains in achieving socio-economic missions. Report for the Department for Business and Trade (DBT).

⁸ France Stratégie (2020) [Les politiques industrielles en France: évolutions et comparaisons internationales](#)

Box 3. Selected International Examples of Sector Plans

United States

In response to the Executive Order 14017 on America's Supply Chains, the Departments of Commerce, Energy, Defence, and Health and Human Services carried out studies to identify risks in the supply chain for critical sectors and formulate policy recommendations to address gaps within these sectors' supply chains.

The report titled "*Building Resilient Supply Chains, Revitalizing American Manufacturing, and Foster Broad-Based Growth*" was published in June 2021. The report was produced by a task force that convened more than a dozen departments and agencies and drew from consultations with hundreds of stakeholders, public comments submitted by industry and experts, and analytic research by experts from across the United States government.

The report outlines a series of policy recommendations aimed at rebuilding production and innovation capabilities in four selected sectors:

- **Semiconductor manufacturing and advanced packaging**
- **Large capacity batteries (mainly for electric vehicles)**
- **Critical minerals and materials**
- **Pharmaceuticals and active pharmaceutical ingredients (APIs)**

These recommendations include: increasing public investments in R&D and commercialisation of key products, identifying potential U.S. production and processing locations for critical minerals, leveraging the government's role as a purchaser of critical goods, strengthening domestic production requirements in federal R&D grants, working with allies to decrease vulnerabilities in the global supply chains, and creating a data hub to monitor near term supply chain vulnerabilities.

China

During his first term as president, Xi Jinping launched a thirty-year 'Manufacturing Powerhouse Strategy' to address concerns that China's manufacturing sector was "large but not strong." The strategy highlighted significant gaps in independent innovation capabilities, resource utilisation efficiency, productivity, and other key areas within the manufacturing industry.

The first phase of this strategy, *Made in China 2025*, was introduced in May 2015 as a ten-year action plan. Its goal is to position China as one of the global manufacturing powerhouses by 2025. Progress is measured using specific indicators, including R&D intensity, manufacturing labour productivity, advancements in the digitalisation of R&D processes, and improvements in energy and resource efficiency within manufacturing operations. The focus areas highlighted in *Made in China 2025* include next-generation IT, high-end CNC (computer numerical control) machines and robots, aerospace, maritime and rail transport, electric vehicles, new materials, machinery and equipment, biotech, pharmaceutical and medical devices.

To achieve its objective, the action plan outlines eight key enablers:

- The reform of governance
- Business-friendly market environment
- Financial support policy support

- Tax and fiscal policy support
- Upskilling and training system
- Policy supports for micro-, small, and medium-sized enterprises (SMEs)
- Further opening up of the manufacturing industry
- A comprehensive implementation framework, including a leading group, strategic advisory committee, third-party think tanks and an evaluation mechanism

Sources:

The White House (2021). Building resilient supply chains, revitalizing American manufacturing, and fostering broad-based growth

PRC State Council (2015). Notice of the State Council on the Publication of "Made in China 2025"