

**INDUSTRIAL
STRATEGY**



**UK Research
and Innovation**

Transforming Foundation Industries challenge

Summary report: Innovation Readiness in UK Foundation Industries
March 2021



Developed by



Foreword



Bruce Adderley
Challenge Director
Transforming Foundation Industries
UKRI

“

As we move ever further into the 21st century the challenges induced by climate change, the need for long-term sustainability in all that we do, and the continued development of society – which has driven the foundation industries to their present scale and scope – all need to be rapidly addressed.

”

The foundation industries exist as we know them today because of a series of crucial innovations that allowed them for the first time to be manufactured at a scale and price that economies across the globe could afford. Each industry has continued to innovate and evolve, meaning that this has consistently been the case over decades (in some cases even centuries) – and if you look out over the London skyline today over 75% of all the man-made materials you see will have been made by these industries.

But as we move ever further into the 21st century the challenges induced by climate change, the need for long-term sustainability in all that we do, and the continued development of society – which has driven the foundation industries to their present scale and scope – all need to be rapidly addressed. Just as in their beginnings, innovation will be a key to enabling the foundation industries to meet these challenges.

The Transforming Foundation Industries Challenge is one response to this need and is a programme of interventions designed to stimulate scale-up of the innovation pipeline focused on creating a commercially sustainable future for these industries. The pace of change continues to increase however (take for example the UK’s significantly increased ambition regarding Net Zero), and so it is only right that we regularly review what may be blocking more rapid innovation. To do this requires as much evidence, both quantitative and qualitative, as we can gather, and hence we have commissioned this report.

Within the full report you will find further evidence to support actions already being taken by the Challenge and more widely across the foundation industries but, most importantly, it also provides evidence of where we must act faster or address additional barriers to innovation. If we are to meet 21st century societal challenges such as climate change then we must act on these now.

A summary report

SECTION 1 – INTRODUCTION

What are the UK's Foundation Industries?

The UK's foundation industry is comprised of six manufacturing sectors – cement, ceramics, chemicals, glass, paper and metals.

KEY STATISTICS:

- Over 7,000 businesses
- A workforce of over a quarter of a million
- A combined turnover of over £67.5 billion (ONS 2020)

KEY CHARACTERISTICS:

- Similar to the wider economy, though perhaps in contrast to public perception, the majority of businesses in the foundation industries are relatively small with almost nine in ten employing fewer than 50 people.
- These sectors underpin activity across a wider segment of the economy with two-thirds of output sold to other UK businesses.
- There are very few new entrants to these sectors, which leads to exceptionally low levels of churn and little new competition for incumbents.
- Foundation industry businesses tend to be energy and capital intensive, which means they face profound pressures to reduce their carbon emission in a commercially viable manner.

The performance of the UK's foundation industries

The UK's foundation industries have underperformed the rest of manufacturing and international competitors in the decade following the 2008/09 recession. This has left the UK with one of the smallest foundation industry sectors relative to GDP in the OECD.

Like other sectors of the economy, foundation industry businesses have experienced a severe reduction in turnover and employment as a result of the COVID-19 pandemic and many have adjusted

their future growth forecasts accordingly. A net balance of foundation industry businesses expects capital investment and R&D budgets to be lower even as more 'normal' trading conditions resume.

Discussions with industry representative bodies confirmed findings in the literature that the two most significant challenges facing the foundation industry sectors are increased international competition and high energy costs, alongside associated regulatory pressures to reduce emissions and environmental impacts.

Despite the challenges faced by foundation industries in recent years, there are nevertheless opportunities for future growth from investment in infrastructure, demand for high-performance materials, improvements in productivity and further progress towards more resource-efficient production processes.

What Questions Need to be Asked About Innovation in the Foundation Industries?

How innovative are businesses in the UK foundation industries?

What factors shape innovation in these sectors?

What are the barriers businesses face in developing new and improved products and services?

How can policy makers support foundation industries to build long-term success in the UK?

These are just some of the questions this new project has set out to answer. The research provides an evidence-based understanding of the factors that shape innovation across six UK foundation industry sectors, and in doing so, aims to provide a basis for new policy thinking.

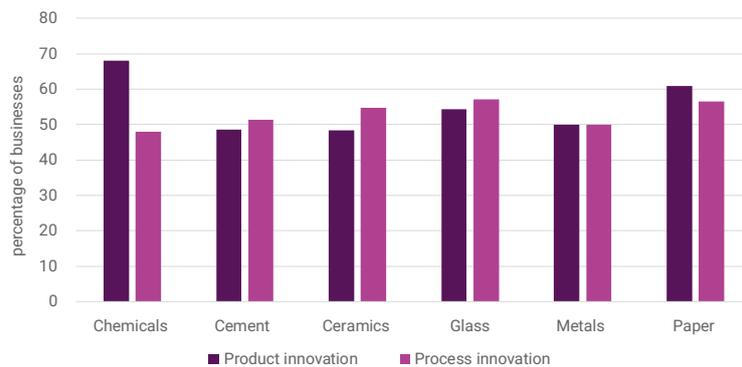
The full report and analysis can be found [here](#). Key findings are presented in this summary document.

SECTION 2 – KEY FINDINGS

2.1 Innovation activity in the UK's foundation industries

- Innovation intensity in the UK's foundation industries is generally lower than that in key competitor countries.
- Innovation is uneven throughout the UK's foundation industries: well over a third of businesses in these sectors had not introduced new products in the last three years and a similar proportion had not introduced new processes.

Percentage of foundation industry businesses introducing new or improved product and processes in the past three years by sector

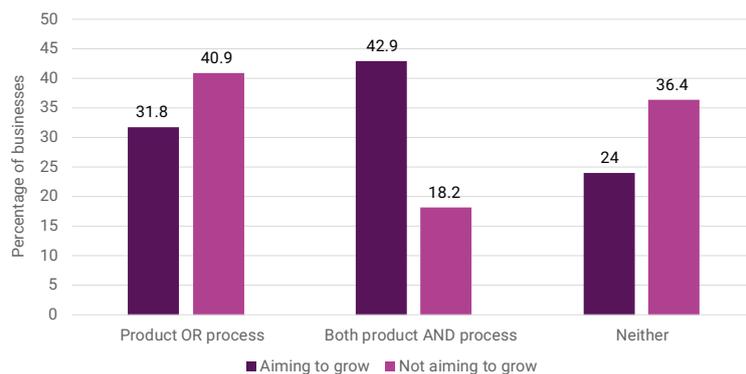


- Smaller businesses are markedly less likely than larger ones to be innovation active. This is important because approximately 98% of businesses in these sectors are SMEs.
- Most reported innovation results in new to firm rather than new to market products and processes, indicating a reluctance to adopt novel, unproven technologies.

2.2 What drives innovation in foundation industries?

- The research findings show that innovation in the foundation industries is driven by a number of factors. The most commonly reported drivers were increasing sales and market share, improving quality, maintain competitive advantage, reducing costs, increasing production capacity.
- There is also a strong correlation between growth ambition and innovation.
- Innovation in foundation industry businesses often occurs in response to 'crises' rather than systematically or proactively.

Percentage of companies innovating in the past three years by growth ambition



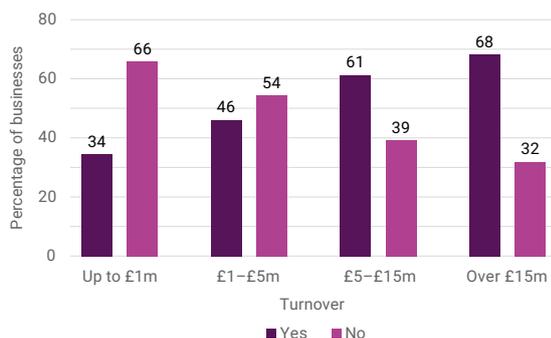
2.3 How do foundation industry business innovate?

- There is some reported innovation engagement with other businesses in the supply chain, but this is less common with businesses outside the supply chain and with universities and research institutions. Overall, innovation collaboration in foundation industry sectors is not widespread
- The use of external business advice is limited but does yield reported benefits in terms of overcoming technical issues and meeting objectives more quickly.
- Industry representative bodies and trade associations vary in the extent to which they actively encourage and support innovation throughout their sectors.
- Around half of FI businesses had applied for or received R&D tax credits, innovation loans or other innovation support during the last three years, higher than that reported in the wider manufacturing sector.

2.4 Energy and resource efficiency in foundation industries

- Despite the energy intensive nature of foundation industry businesses, the drive to increase energy and resource efficiency is not a common motivation for innovation, but is correlated with the size of business.
- However, around half of foundation industry businesses reported making some investment in technology to improve energy or resource efficiency in the past three years, with these investments more likely to have occurred in larger businesses.

Percentage of businesses investing in new technologies to improve energy/resource efficiency by firm size



- Businesses also report financial constraints in adopting new technologies to improve resource efficiency, with some also noting that they have achieved all the gains possible with existing technology.

2.5 What is holding back non-innovators?

- For non-innovating foundation industry businesses the most reported constraints to innovation were risk, the high costs of innovation and uncertainty around the UK's relationship with the EU.
- There is a widespread perception across surveyed businesses that under-developed management and leadership skills in foundation industry businesses act as a constraint on innovation activity
- Innovation in the UK's foundation industries is also constrained by a number of structural factors. These barriers are important, not just because they hold back innovation directly, but also indirectly because they undermine the effectiveness of more focused policy measures.

STRUCTURAL BARRIERS:

- High entry barriers and associated very low levels of churn.
- Under-developed management and leadership skills.
- Dispositions and mindsets resistant to innovation.
- Widespread reluctance to collaborate.
- Regulatory and other pressures to achieve profound reductions in carbon emissions.

SECTION 3 – IMPACTING POLICY

There is evidence and a powerful rationale for policy development to tackle this issue, as there are clear market failures affecting the level of innovation within the UK's foundation industries. In addition, there are a number of distinctive features of these sectors that need consideration when developing policy solutions.

The very low levels of new entrants to these sectors limit churn and thereby constrain competition, dynamism, and innovation activity. Beyond this, there are also widespread information failures, which result in exaggerated perceptions of the costs and risks associated with innovation.

COMPANIES

Tailor management training to be more focused on the specifics of managing (innovation) within each industry

Encourage networking and knowledge-sharing among managers across the foundation industry sectors

FUNDING APPLICANTS

(including business, academics, researchers and technology innovators)

Focus applications on collaborative projects and consortia that include smaller businesses and those from supporting sectors to expand the pool of ideas and learnings

Ensure an established framework is in place to maintain close collaboration between industry and research institutions

Policy options

There is a range of possible policy solutions to drive higher levels of innovation activity across foundation industry businesses. Action is required across government departments and agencies, and as well as industry stakeholders and foundation businesses themselves to make these efforts a success. Each group has a key role to play in the wider development of new solutions for the sector and the push towards more sustainable and efficient industries.

INDUSTRY BODIES

Identify ways to promote innovation and opportunities for peer-to-peer learning

Work to identify which members may need support, or which could provide support to others

FUNDING BODIES

Enhance engagement between industry, research, science, technology and end-users to inform innovation

Identify priorities and barriers, and adapt funding targeting accordingly

Encourage new entrants into the sector

SECTION 4 – CONCLUSIONS

This research has shown, very clearly, that there are both structural and local, firm specific, factors that shape innovation performance in the foundation industries. Real progress in promoting higher levels of innovation depends, fundamentally, on addressing both these levels of causality.

In practice, resources are limited and there are very real pressures on policy makers to implement policies that will produce quick and tangible impacts.

However, unless the structural barriers to dynamism and increased innovation are effectively addressed, progress will be, at best, limited. Amongst other things, this will require realism about what structural changes can be achieved and the timeframes necessary for such changes to be realised.



This project was undertaken by Lee Hopley, Dr Ian Drummond and Dr Temitope Akinremi from the Enterprise Research Centre (ERC) on behalf of UKRI between February and November 2020 as firms were experiencing the impacts of the COVID-19 pandemic. The project focused primarily on the longer-term position of the foundation industries but took into account pandemic impacts.

The research was concerned to provide an evidence-based understanding of the factors that shape innovation across six UK foundation industry sectors - metals, paper, chemicals, glass, ceramics, and cement - and in doing so to provide a better-informed basis for policy development.

The research comprised of a detailed literature review, a survey of 249 businesses in foundation industries undertaken by our research partners OMB Research Ltd, as well as a combined 28 in-depth qualitative interviews with businesses and key industry stakeholders.

We would like to thank all of the trade associations and businesses who participated in the qualitative interviews, as well as those who contributed to the development of the wider research.