

THE PRACTICAL IMPACT OF THE 'DIGITAL REVOLUTION'

ANALYSIS OF THE INTERNATIONAL EVIDENCE

The challenge: to get a better understanding of the real impact of digital technologies on manufacturing firms

The UK government's 2017 Made Smarter review estimates that by adopting digital technologies UK industry could achieve a 25% increase in productivity by 2025. And they are not alone. All the major manufacturing nations are making predictions about the potential impact of the 'digital revolution' on their economies. But most estimates are based on crude economic extrapolations and survey data. With digitalisation well underway, we now have an opportunity to try to understand what is really going on and if it is living up to expectations. This study from Policy Links indicates that there are grounds for cautious optimism.

THE CLIENT NEED >>>

Innovate UK (IUK) wanted to understand how the digital revolution is playing out in the major manufacturing economies and if there are lessons the UK can learn in terms of the impact achieved by the programmes they have put in place to support digital transformation. Policy Links and senior colleagues from the Institute for Manufacturing (IfM) were asked to consider how digital technologies are being deployed and evaluate the impact they are having on the firms that are embracing them. This was by no means an easy task, given the scale of activity around the globe and the range and variability of the available data.

THE APPROACH >>>

The first task was to develop an approach that would deliver robust results. This meant defining which countries, types of programmes, firms and activities the study would include and the data it would need to collect.

A key element of the project was the development of a common framework that would allow the team to collate and compare data from different organisations in different countries, all using different terminology and measuring different things.

THE SCOPE

The focus was on the impact of digital manufacturing initiatives on individual firms – particularly small and medium-sized enterprises (SMEs) – in key manufacturing countries such as China, France, Germany, Korea, Japan, Singapore, the US and Canada. The emphasis was on those interventions that are designed to help firms deploy new technologies rather than those that are supporting the early development of new technologies.

The study's aim was to:

- Develop a set of key indicators to help assess the expected – and where the data exists, the actual – impact of digitalisation at a national level
- Compare the levels of funding countries are committing to their digital programmes
- Identify which activities are being most affected by the adoption of digital technologies and where the business value is being created
- Understand where different countries are focusing their digital efforts

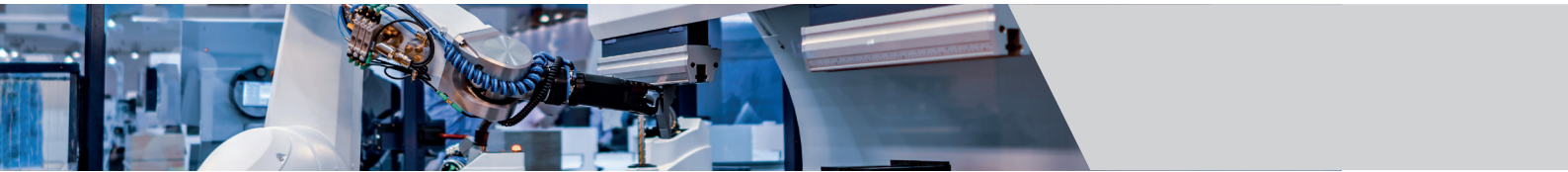
IfM COLLABORATORS

- **Professor Duncan McFarlane**, Head, Distributed Information & Automation Laboratory
- **Dr Eoin O'Sullivan**, Director, Centre for Science, Technology & Innovation Policy
- **Dr Chander Velu**, Head, Business Model Innovation Research Group
- **Dr Carlos López-Gómez**, Head, Policy Links Unit

IMPACT

This study provided IUK with key evidence for a business case for government support for digital manufacturing in the UK. As a result, an additional £120 million investment was announced in 2018 for 'Made Smarter' (in the form of R&D, demonstration and growth support).





KEY FINDINGS >>>

WHERE ARE FIRMS GETTING THE MOST VALUE FROM DIGITALISATION? (FROM OBSERVED USE-CASES)

In order to get a better understanding of what is going at the firm level, the team identified over 1,000 use cases from across the major manufacturing economies and selected around 200 for closer scrutiny.

In each of these cases, they looked at the types of digital applications that firms were using to support their different business activities. Figure 1 shows the areas where manufacturing firms participating in with government-supported initiatives are focusing the use of digital technologies:

- ▶ Increase in process efficiency: ~ 30% of instances
- ▶ Reduction of labour costs: ~ 16% of instances
- ▶ Reduction of defects and errors: ~ 10% of instances
- ▶ Reduction of energy costs: ~ 6% of instances
- ▶ Improved delivery & services performance: ~ 6% of instances

While the findings support a positive view of the impact of digitalisation, they also suggest that the areas where most companies focused their applications are not necessarily those that have seen the most benefit.

Top five business areas benefitting most from digital initiatives (and median % improvement) include:

- ▶ Reduction in labour costs: >55%
- ▶ Reduction in defects & errors: >45%
- ▶ Reduction in material costs: >45%
- ▶ Increase in outputs: >30%
- ▶ Improvements in delivery & service performance: >30%

EXPECTED IMPACT OF DIGITALISATION ON NATIONAL ECONOMIES

Productivity

National governments estimate productivity gains of up to 30% by 2025 in Germany, and 30% by 2024 in Singapore. In Japan, the government estimates that growth in labour productivity in manufacturing could be increased by more than 2% annually, citing an expected doubling of robot use by 2020.

Value added

Value added is the most common indicator used in the sample of countries surveyed. The results range from Germany's predicted €425 billion to Canada's C\$34 billion, but it should be noted that these figures very much reflect differences in the sizes of national economies.

Jobs

Counter to the commonly held view that digitalisation will have a negative impact on jobs, those countries for which there is data are forecasting that digitalisation will have the opposite effect, with Spain estimating 1.25 million new jobs would be created in the next five years.

OBSERVED IMPACT OF DIGITALISATION ON NATIONAL ECONOMIES

Few countries have published data on real (observed) – as opposed to expected – impact. Of those that have, both Singapore and Korea report the same levels of improvements in manufacturing efficiency at the firm level (30%). In Korea, systematic efforts have been made to evaluate the firm-level impacts of digital adoption on 3,000 firms supported by a major national programme, the Korea Smart Manufacturing Initiative.

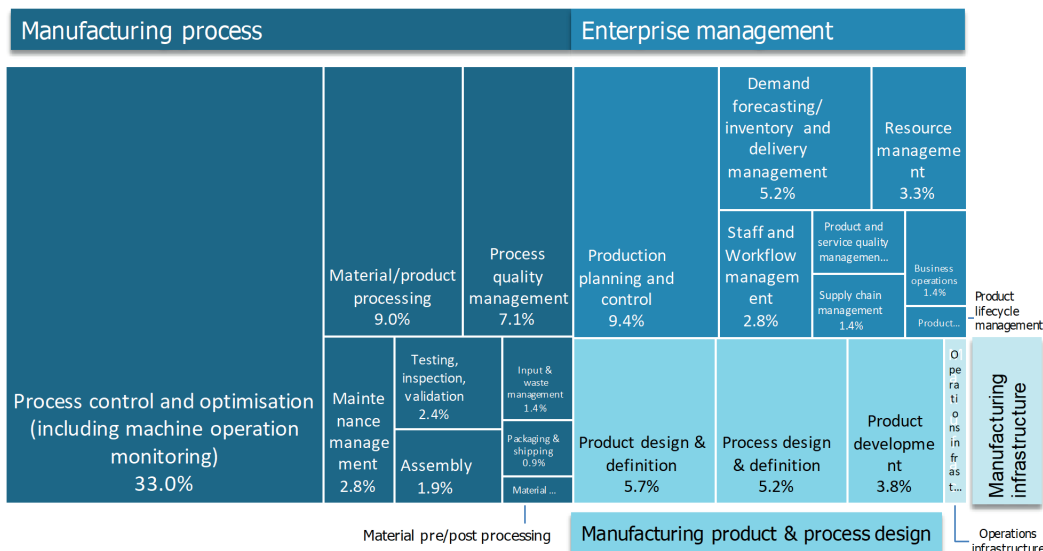


Figure 1: Image shows usage of digital applications & solutions Share of use-cases reported by functional area (%)

ABOUT POLICY LINKS

Policy Links is a not-for-profit innovation policy consultancy unit whose aim is to help governments develop more effective industrial innovation policies. It is the knowledge transfer unit of the Centre for Science, Technology & Innovation Policy (CSTI), University of Cambridge.

FIND OUT MORE:
www.ifm.eng.cam.ac.uk
 +44(0)1223 766141