Benchmarking local innovation – the innovation geography of England: 2019

ERC Research Report

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Benchmarking local innovation – the innovation geography of England: 2019

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EXECUTIVE SUMMARY

Firms' ability to innovate successfully plays an important role in their ability to sustain growth and competitiveness. This report provides innovation benchmarks for local areas in England, updating our previous analysis published in 2017.

The benchmarks are based on a new analysis of data from the 14,000 firms which responded to the UK Innovation Survey 2017. The analysis is designed to provide representative results for each local economic area. Information is provided on ten benchmarks including new indicators for organisational innovation.

Three benchmarks focus on forms of organisational and marketing innovation. Three further metrics relate to the inputs and structure of firms' innovation activity with a focus on R&D, design investment and collaboration. Arguably the most important, the remaining four metrics relate to the outcomes from firms' innovation reflecting both the extent of innovation across the population of firms as well as the success of innovation.

Three key results stand out in terms of the overall geography of innovation in England:

- Reflecting the results of our earlier analysis of the 2015 UK Innovation Survey, we find a concentration of relatively high levels of product and service innovation and new-to-the market innovation in an arc of local economic areas in the South and East Midlands and along the M4 corridor. Albeit with some variation, these areas are characterised by high proportions of innovating firms, a high incidence of new-to-the-market innovation, and relatively high levels of revenue from innovation.

- We observe a rather different geography in terms of process innovation with higher levels of process innovation activity in some Northern and peripheral areas where product/service innovation is less common.

- Our benchmarks for organisational innovation suggest a rather less clear geographical pattern with a range of different local areas performing relatively strongly. Areas in the 'arc of innovation' also tend to perform relatively strongly on these metrics too however.

Our analysis highlights the diversity of innovation activity across the UK. Some local areas are marked by strengths in organisational innovation but weaker elsewhere; others exhibit higher levels of collaborative behaviour and R&D. Both suggests the value of differentiated local innovation strategies which can build on existing strengths and remedy weaknesses.

In considering these results and the benchmarks for individual areas it is important to remember that our benchmarks are based on survey data. This inevitably means that our results are subject to some measurement error.

1. INTRODUCTION

Firms' ability to innovate successfully plays an important role in their ability to sustain growth and competitiveness. For local areas this means that the more innovative are local companies the stronger the prospects for growth. In this report we provide a series of benchmarks which profile the level of innovative activity for local economic areas across England.

The benchmarks we report cover Local Economic Areas, defined by individual LEPs in England. Tables relate to the 39 LEP geography used prior to the recent consolidation to allow a direct comparison with our 2013 and 2015 reports.

Tables and maps are based on a new analysis of the UK Innovation Survey 2017 which relates to firms' innovation activity during the three-year period from 2014 to 2016. Constructing the benchmarks has involved re-weighting survey responses to provide results which are representative of each local economic area. We report a range of benchmarks representing different aspects of firms' innovation activity. The first three benchmarks focus on forms of organisational and marketing innovation:

- ***Firms engaged in the introduction of new business practices***– the proportion of firms reporting the adoption of new business practices during the 2014 to 2016 period.
- ***Firms engaged in the introduction of new methods of organising work responsibilities*** – the proportion of firms reporting the adoption of new work organisation methods during the 2014 to 2016 period.
- ***Firms engaged in marketing innovation*** – the proportion of firms reporting changes to marketing concepts or strategies.

The next three metrics relate to the inputs and structure of firms' innovation activity with a focus on R&D, design investment and collaboration:

- ***Firms engaged in R&D*** – the proportion of firms reporting undertaking R&D over the 2014 to 201 period (either internal or external).
- ***Firms engaged in design*** – the proportion of firms reporting investing in design as part of their innovation activity over the 2014 to 2016 period.
- ***Firms that were collaborating as part of their innovation activity*** – the proportion of firms partnering with other organisations as part of their innovation activity.

Arguably the most important benchmarks, the remaining four metrics relate to the outcomes from firms' innovation reflecting both the extent of innovation across the population of firms as well as the success of innovation:

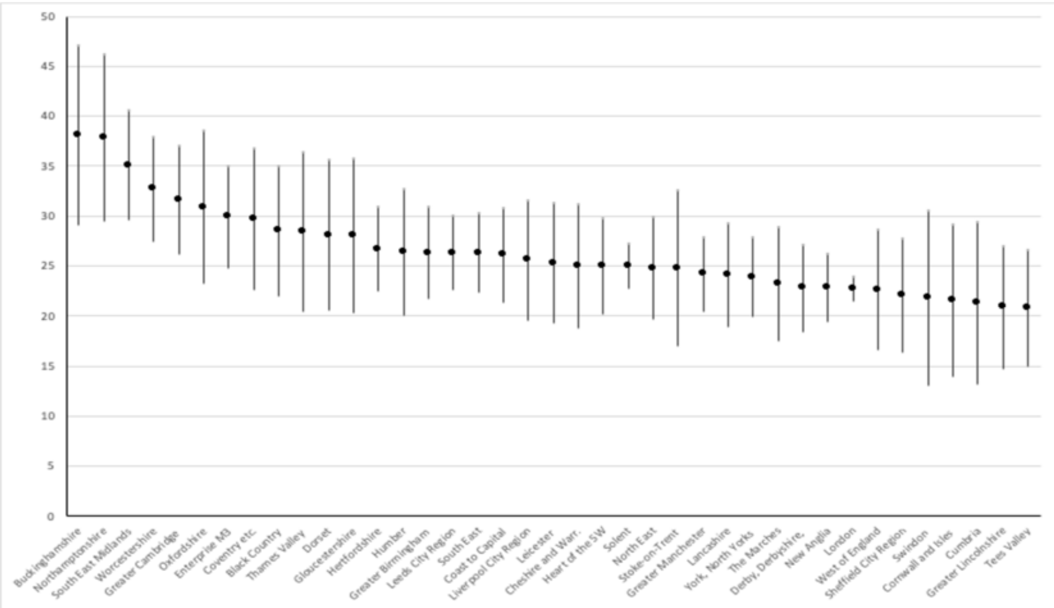
- ***Firms engaged in product or service innovation*** – measured as the proportion of firms reporting the introduction of a new or significantly improved product or service during the 2014 to 2016 period.
- ***Firms engaged in new to the market innovation*** – measured as the proportion of firms reporting that their new products or services were new to the market.

- ***Firms' sales of innovative products or services*** – measured as the average proportion of sales derived from innovative products and services in 2014. This provides an indication of the early market success of firms' new products and services.
- ***Firms engaged in process innovation*** - the proportion of firms reporting the introduction of a new or significantly improved process during the 2014 to 2016 period.

Details of the approach used to derive the individual benchmarks are provided in Annex 1.

In reading this report it is important to acknowledge that the benchmarks are based on firms' survey responses and, importantly, that in some smaller areas the number of respondents is relatively low. This inevitably means that the benchmarks are subject to potential measurement errors due to non-response or disproportionate response by particular groups of firms to the 2017 UK Innovation Survey. To illustrate Figure A below provides the mid-point estimates and 95 per cent confidence intervals for the benchmark for the proportion of firms engaged in product or service innovation (see also Table A2).

Figure A: Mid-point estimates and 95 per cent confidence intervals for the percentage of firms engaged in product or service innovation



Care is therefore necessary in interpreting the results which should only be seen as providing a general indication of the engagement of firms with innovation in each local area. In many cases, however, local areas which performed strongly in our previous analysis of the 2015 UK Innovation Survey also perform well here.

2. ORGANISATIONAL AND MARKETING INNOVATION

2.1 Introduction of new business practices: 2014 to 2016

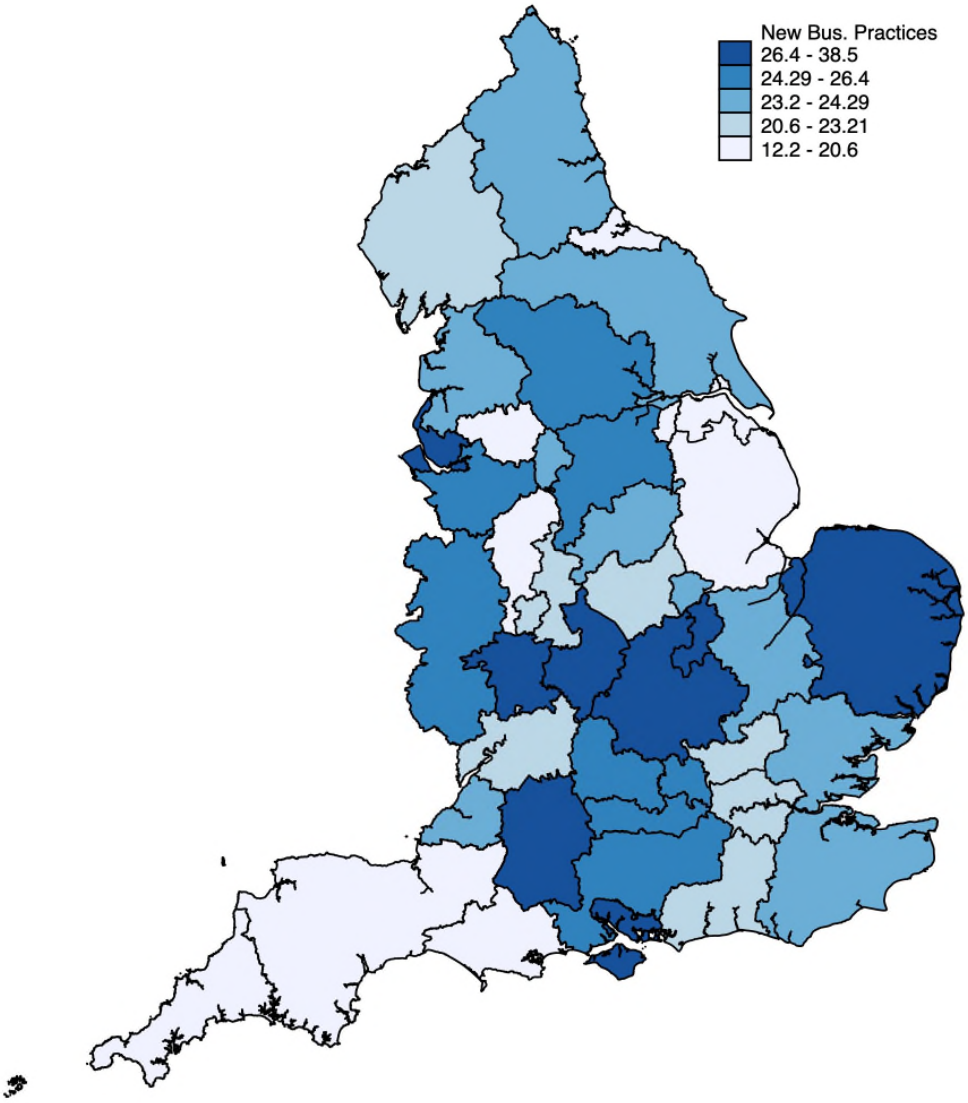
Business model innovation has attracted significant attention in recent years as firms seek new profit opportunities and new ways of creating value for customers and other stakeholders. This benchmark relates to firms' adoption of new organisational processes over the 2014 to 2016 period. Examples of this type of innovation would be: supply chain management, business re-engineering, knowledge management, lean production, quality management.

The spread of this benchmark across local economic areas is relatively wide: 38.5 per cent of firms in Swindon and Wiltshire reported introducing new business practices over the 2014 to 2016 period compared to only 12.2 per cent in Humber. There is little very clear geographical pattern to this measure although those local economic areas which perform most strongly on product and service innovation and innovative sales – e.g. Oxfordshire, South East Midlands, Greater Cambridge and Peterborough - also tend to perform relatively strongly in terms of new business practices. Firms in the South West (Cornwall, Dorset, Heart of the South West) perform less strongly on this metric.

Table 1: Introduction of new business practices by local economic area (% of firms)

LEP	% firms	Rank	LEP	% firms	Rank
Swindon and Wiltshire	38.5	1	York, N. Yorks, E. Riding	23.5	21
Worcestershire	30.9	2	North East	23.4	22
Coventry and Warks.	30.2	3	Gtr Cambs, Gtr P'borough	23.3	23
Northamptonshire	29.8	4	Gtr. Birmingham, Solihull	23.2	24
Solent	28.8	5	Cumbria	23.1	25
Liverpool City Region	27.0	6	Gloucestershire	22.8	26
South East Midlands	26.5	7	Black Country	22.5	27
New Anglia	26.4	8	Coast to Capital	22.5	28
Enterprise M3	26.2	9	London	22.2	29
Buckinghamshire	25.8	10	Leicester, Leicestershire	22.0	30
Sheffield City Region	25.5	11	Hertfordshire	21.3	31
Cheshire and Warrington	25.3	12	Dorset	20.6	32
The Marches	25.1	13	Heart of the South West	20.6	33
Leeds City Region	24.7	14	Greater Manchester	20.4	34
Oxfordshire	24.6	15	Stoke-on-Trent and Staffs	20.4	35
Thames Valley Berkshire	24.3	16	Tees Valley	19.6	36
Lancashire	24.2	17	Cornwall, Isles of Scilly	18.1	37
West of England	24.0	18	Greater Lincolnshire	17.5	38
Derby, Nottingham etc.	23.9	19	Humber	12.2	39
South East	23.5	20			

Figure 1: The geography of new business practices by local economic area (% of firms)



2.2 New Methods of Work Organisation

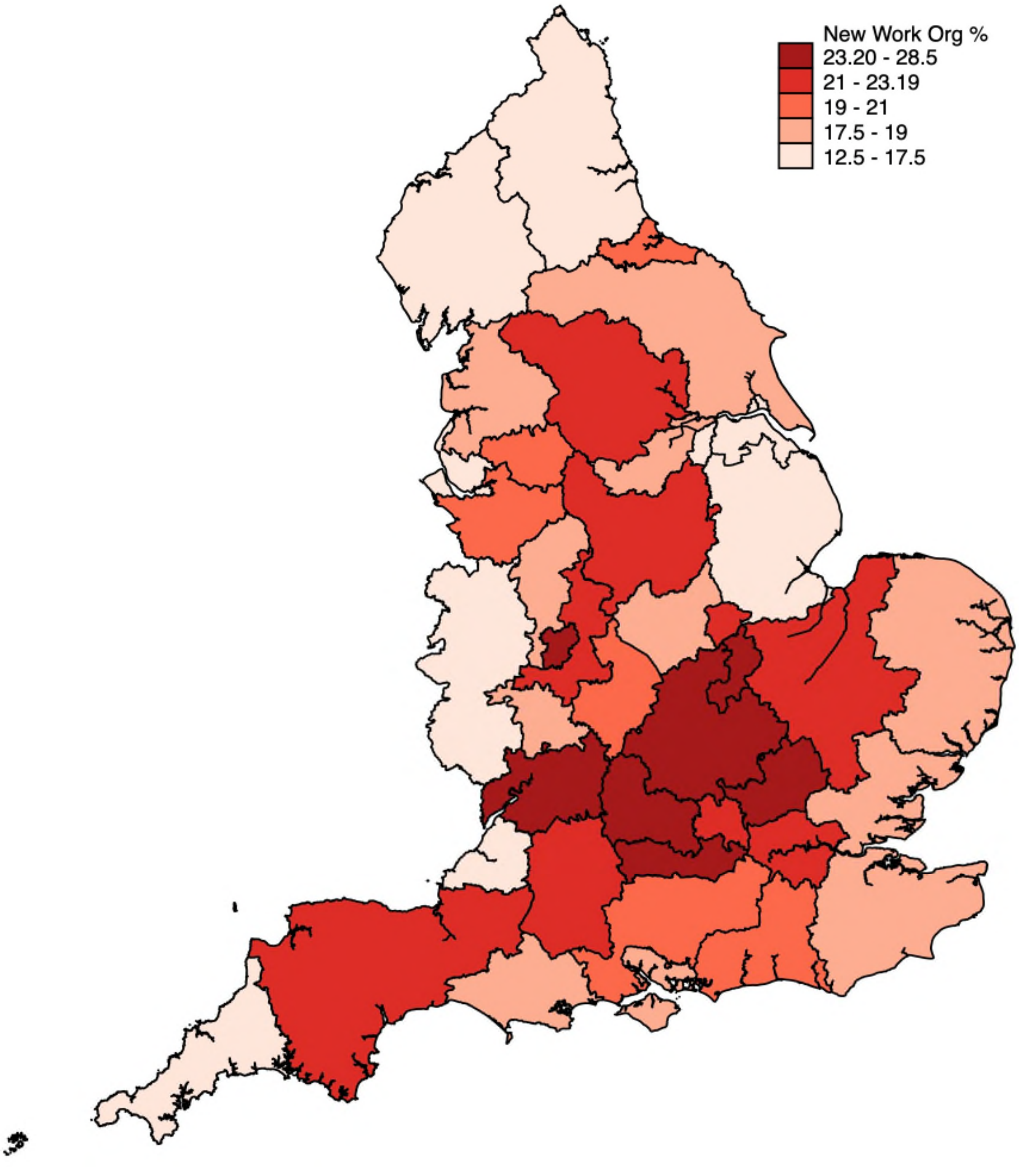
The way work is organised and structured can play an important role in shaping levels of innovative activity. Rigid, hierarchic forms of work organisation can hinder innovation, while more fluid, risk-tolerant regimes can facilitate creative thinking. This metric relates to a survey question which focuses on firms' adoption of 'new methods of organising work responsibilities and decision making. Examples are firms' first use of a new system of employee responsibilities, team work, decentralisation, integration or de-integration of departments, education / training systems.

As with the introduction of new business practices, we see wide variation between the proportion of firms in each LEP area reporting the implementation of new forms of work organisation. The overall correlation with the benchmark relating to the introduction of new business practices – 0.14 – is, however, relatively low. Here we see a stronger geographical pattern with a central cluster of more innovative LEP areas – Oxfordshire, Northamptonshire, Gloucestershire and South East Midlands – which perform strongly on this and a range of other metrics (Figure 2).

Table 2: Introduction of new methods of work organisation by local economic area (% of firms)

LEP	% firms	Rank	LEP	% firms	Rank
Black Country	28.5	1	Tees Valley	19.4	21
Oxfordshire	27.4	2	South East	19.0	22
Northamptonshire	26.9	3	Worcestershire	19.0	23
Gloucestershire	26.7	4	York, N. Yorks, E. Riding	19.0	24
South East Midlands	25.1	5	Dorset	18.3	25
Hertfordshire	23.7	6	New Anglia	18.1	26
Thames Valley Berkshire	23.7	7	Leicester, Leicestershire	18.0	27
Buckinghamshire	23.2	8	Stoke-on-Trent and Staffs	18.0	28
Derby, Nottingham etc.	23.1	9	Lancashire	17.8	29
Swindon and Wiltshire	22.3	10	Solent	17.7	30
Gtr. Birmingham, Solihull	22.2	11	Sheffield City Region	17.7	31
Gtr Cambs, Gtr P'borough	21.4	12	The Marches	17.5	32
London	21.3	13	Humber	16.7	33
Heart of the South West	21.1	14	Liverpool City Region	16.2	34
Leeds City Region	21.1	15	West of England	16.0	35
Enterprise M3	21.0	16	North East	15.1	36
Coventry and Warks.	20.8	17	Cumbria	13.6	37
Cheshire and Warrington	20.4	18	Cornwall, Isles of Scilly	12.7	38
Coast to Capital	19.9	19	Greater Lincolnshire	12.5	39
Greater Manchester	19.4	20			

Figure 2: The geography of new methods of work organisation by local economic area (% of firms)



2.3 Marketing innovation

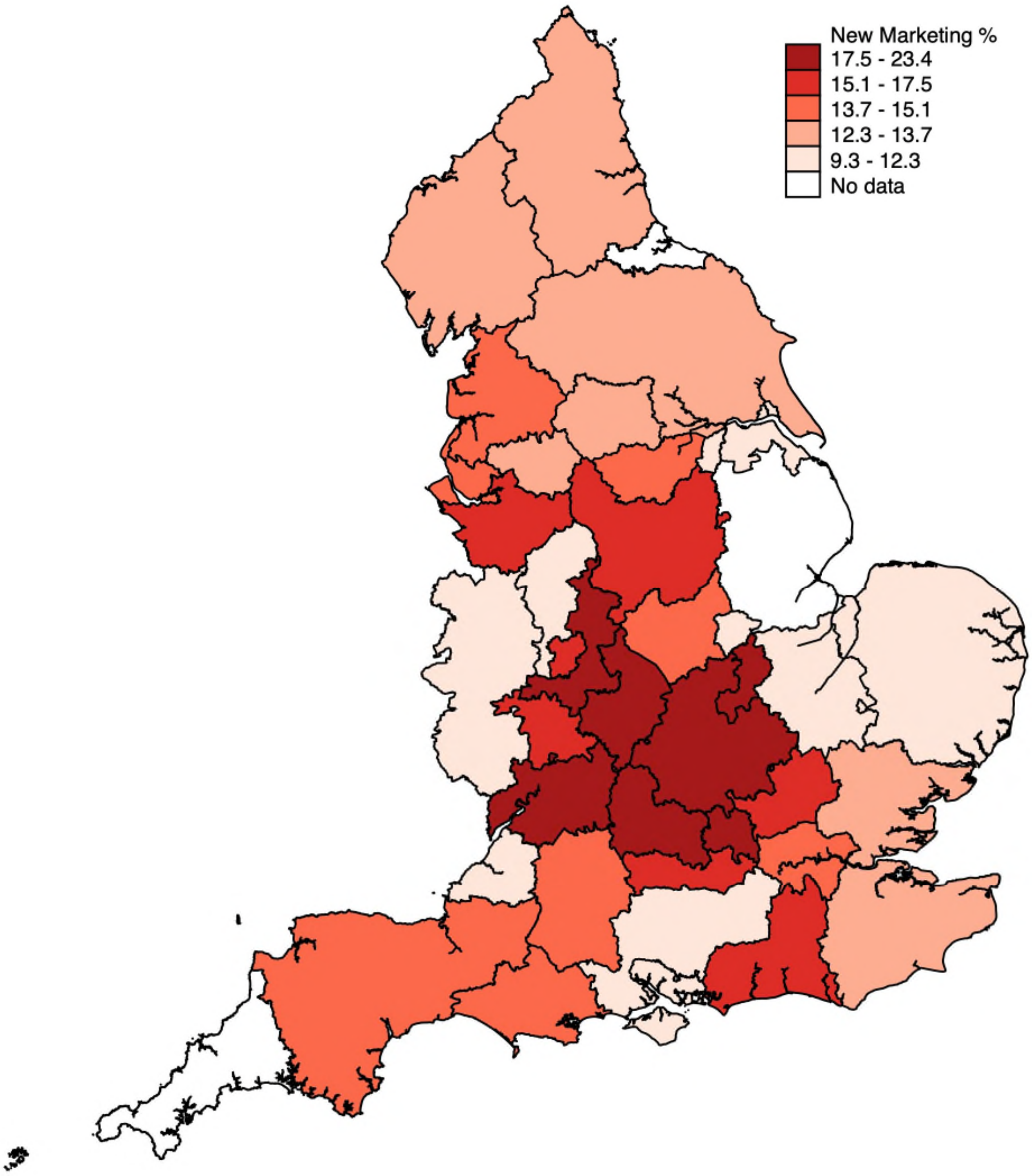
Alongside product, service and process innovation it is increasingly recognised that significant commercial advantage may also stem from marketing innovations. This metric is derived from a survey question which asks firms whether over the 2014 to 2016 period they implemented 'changes to marketing concepts or strategies'. As previously the metric is expressed as the percentage of firms in each local economic area undertaking this type of marketing innovation over the three-year period covered by the survey. In a number of LEAs figures for this metric were not available due to confidentiality requirements.

Again, we see significant variations in this metric between local economic areas with 23.4 per cent of firms in Northamptonshire and Oxfordshire reporting the implementation of new marketing concepts and strategies compared to only 9.3 per cent in Stoke-on-Trent and Staffs. There is a tendency for areas which perform well on the other organisational metrics also to perform well in terms of marketing innovation with a marked regional geography (Figure 3). Again, however, there are positive correlations between this benchmark and those for new business practices (0.31) and work practices (0.77).

Table 3: Marketing innovation by local economic area (% of firms)

LEP	% firms	Rank	LEP	% firms	Rank
Northamptonshire	23.4	1	Leicester, Leicestershire	14.0	21
Oxfordshire	23.4	2	Swindon and Wiltshire	13.7	22
South East Midlands	19.0	3	Leeds City Region	13.5	23
Gloucestershire	18.7	4	Cumbria	13.4	24
Buckinghamshire	18.5	5	Greater Manchester	13.1	25
Gtr. Birmingham, Solihull	18.0	6	North East	13.0	26
Coventry and Warks.	17.9	7	York, N. Yorks, E. Riding	12.9	27
Coast to Capital	17.5	8	South East	12.6	28
Black Country	17.4	9	Enterprise M3	12.3	29
Thames Valley Berkshire	16.8	10	Humber	12.1	30
Hertfordshire	16.5	11	Gtr Cambs, Gtr P'borough	12.0	31
Worcestershire	16.2	12	West of England	11.6	32
Cheshire and Warrington	15.5	13	New Anglia	11.4	33
Derby, Nottingham etc.	15.4	14	Solent	11.4	34
Lancashire	15.1	15	The Marches	10.7	35
Sheffield City Region	14.3	16	Stoke-on-Trent and Staffs	9.3	36
Heart of the South West	14.2	17	Cornwall, Isles of Scilly	na	na
Dorset	14.1	18	Greater Lincolnshire	na	na
Liverpool City Region	14.1	19	Tees Valley	na	na
London	14.1	20			

Figure 3: The geography of marketing innovation by local economic area (% of firms)



3. R&D, DESIGN INVESTMENT AND COLLABORATION

3.1 Research and development (R&D)

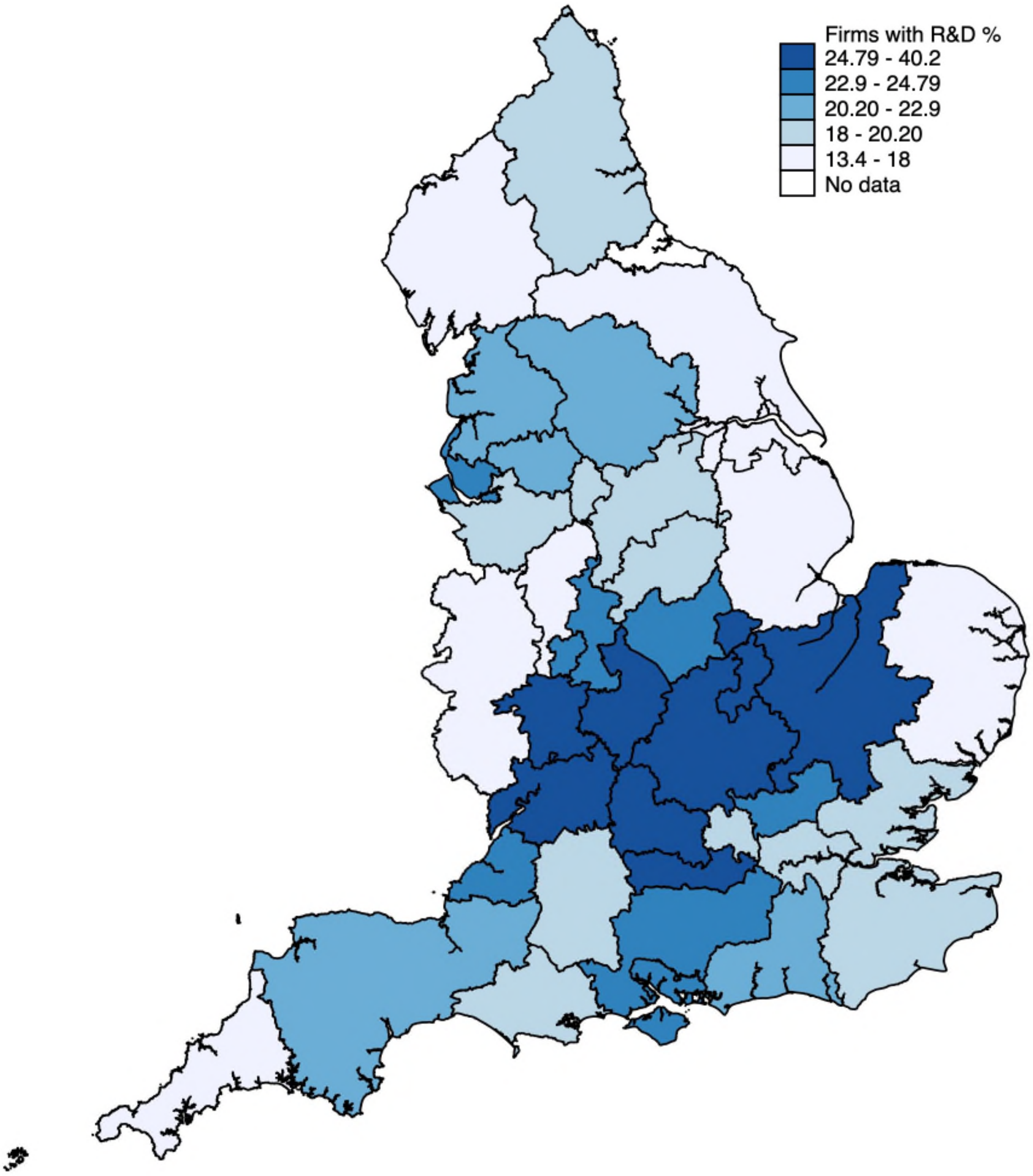
R&D provides one of the key inputs into firms' innovation activity. Not only can R&D provide the new knowledge or technological discovery which might drive innovation. There is also substantial evidence that R&D personnel are important in enabling firms to identify external knowledge or technologies which may help to develop the firm's own innovation. In part this may reflect the expertise of R&D personnel but may also be related to their personal links and networks to other researchers.

Again there is significant variation between local areas in terms of the proportion of firms reporting either in-house or externally sourced R&D activity. In this indicator we see a strong regional pattern with some of the highest reported figures consistent with the 'arc of innovation' identified in our 2017 report covering Oxfordshire, Northamptonshire, SE Midlands and Thames Valley, Berkshire Greater (Figure 4).

Table 4: Percentage of firms undertaking R&D by local economic area (% firms)

LEP	% firms	Rank	LEP	% firms	Rank
Oxfordshire	40.2	1	Heart of the South West	21.2	21
Northamptonshire	35.7	2	Dorset	20.2	22
South East Midlands	30.0	3	Swindon and Wiltshire	20.2	23
Thames Valley Berkshire	28.5	4	Cheshire and Warrington	20.0	24
Coventry and Warks.	28.1	5	London	19.8	25
Gtr Cambs, Gtr P'borough	27.9	6	Sheffield City Region	19.7	26
Worcestershire	25.6	7	South East	19.5	27
Gloucestershire	24.8	8	North East	19.3	28
Enterprise M3	24.6	9	Buckinghamshire	19.1	29
Gtr. Birmingham, Solihull	24.4	10	Derby, Nottingham etc.	18.7	30
Solent	24.3	11	The Marches	18.0	31
Black Country	24.2	12	York, N. Yorks, E. Riding	17.5	32
Hertfordshire	23.4	13	Cornwall, Isles of Scilly	16.3	33
Liverpool City Region	23.2	14	Cumbria	16.2	34
West of England	23.0	15	Greater Lincolnshire	15.7	35
Leicester, Leicestershire	22.9	16	New Anglia	14.8	36
Lancashire	22.7	17	Stoke-on-Trent and Staffs	13.8	37
Coast to Capital	22.2	18	Humber	13.4	38
Greater Manchester	22.0	19	Tees Valley	na	na
Leeds City Region	21.4	20			

Figure 4: Percentage of firms undertaking R&D by local economic area (% of firms)



3.2 Design investment for innovation

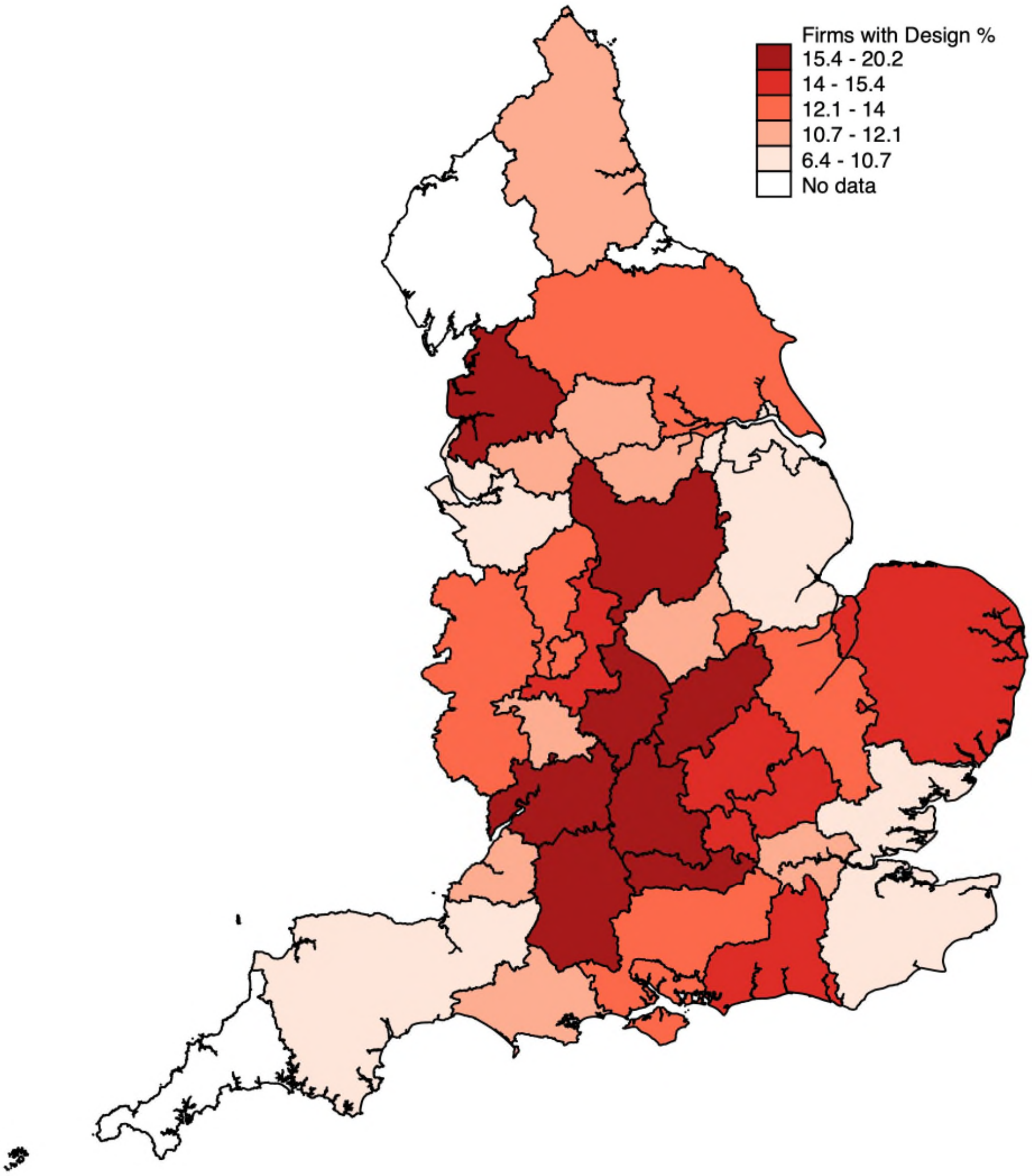
Studies have repeatedly linked design investment to enhanced innovation outcomes in both manufacturing and services. This benchmark relates to firms' investment in all forms of design related to the development or implementation of new or improved goods, services and processes. For this benchmark, figures are not available for three local areas due to confidentiality constraints.

The proportion of firms making design investments for innovation again varies relatively widely between local areas. There is a relatively strong relationship however between areas which perform strongly in terms of R&D (Table 4) and design investment (Table 5). Six of the best performing areas in terms of design investment are also in the top ten performing areas in terms of R&D. Conversely, several local areas which have lower levels of R&D activity also exhibit relatively low levels of design investment. Notably, however, strong performance in terms of design investment has a less coherent geographical focus than R&D investment (Figure 5).

Table 5: Percentage of firms undertaking design investment for innovation by local economic area (% firms)

LEP	% firms	Rank	LEP	% firms	Rank
Swindon and Wiltshire	20.2	1	York, N. Yorks, E. Riding	12.6	21
Coventry and Warks.	19.7	2	London	12.1	22
Gloucestershire	18.6	3	Dorset	11.9	23
Oxfordshire	17.1	4	Leicester, Leicestershire	11.9	24
Northamptonshire	16.8	5	Leeds City Region	11.4	25
Thames Valley Berkshire	15.6	6	North East	11.4	26
Derby, Nottingham etc.	15.4	7	Worcestershire	11.4	27
Lancashire	15.4	8	West of England	11.2	28
Gtr. Birmingham, Solihull	15.3	9	Greater Manchester	10.7	29
Coast to Capital	15.0	10	Sheffield City Region	10.7	30
Hertfordshire	14.6	11	Liverpool City Region	10.2	31
New Anglia	14.5	12	Cheshire and Warrington	9.9	32
Buckinghamshire	14.4	13	Humber	9.4	33
South East Midlands	14.3	14	South East	9.4	34
Solent	14.0	15	Heart of the South West	8.6	35
Enterprise M3	13.9	16	Greater Lincolnshire	6.4	36
Gtr Cambs, Gtr P'borough	13.6	17	Cornwall, Isles of Scilly	na	na
Black Country	13.3	18	Cumbria	na	na
The Marches	13.3	19	Tees Valley	na	na
Stoke-on-Trent and Staffs	13.0	20			

Figure 5: Percentage of firms undertaking design investment for innovation by local economic area (% firms)



3.3 Collaboration for innovation

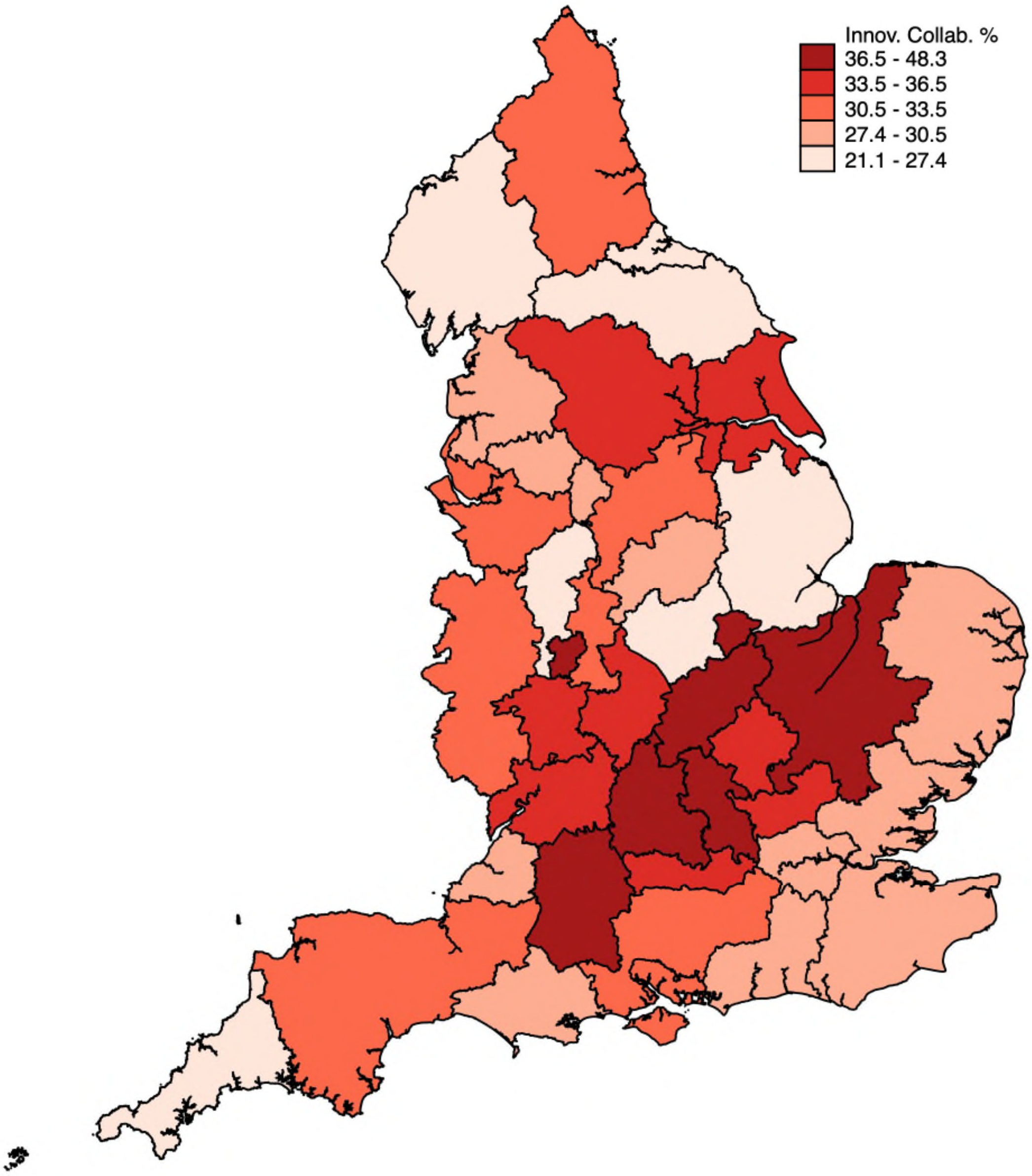
Notions of open, partnering or networked innovation have received considerable recent attention with the research literature suggesting that collaboration can deliver significant benefits for innovating firms. High levels of collaboration by firms in a locality can also help improve knowledge diffusion and ensure that firms maximise the potential of any innovative opportunities. Here, we report a metric based on the percentage of firms in any local economic area which were collaborating for innovation during the period 2014 to 2016. Collaboration need not have been continuous over this period and partners were not necessarily local. The metric simply records whether innovating firms worked with other partners on their innovation activity over this period.

Before considering this benchmark it is worth noting that here issues around sample size in some local areas become more important. Information is only available on collaboration for those firms which did undertake some form of innovative activity during the 2014 to 2016 period. This said, several local areas which perform strongly on other organisational and innovation metrics also perform well here. There is also a strong correlation (0.75) between the R&D and collaboration benchmarks and the benchmarks on collaboration and work re-organisation (0.68). Across England innovation collaboration is strongest around the 'arc of innovation' (Figure 6).

Table 6: Collaboration for innovation by local economic area (% of innovating firms)

LEP	% firms	Rank	LEP	% firms	Rank
Northamptonshire	48.3	1	Solent	31.3	21
Oxfordshire	48.1	2	North East	31.1	22
Gtr Cambs, Gtr P'borough	43.4	3	Sheffield City Region	30.9	23
Black Country	40.7	4	Coast to Capital	30.5	24
Swindon and Wiltshire	37.9	5	Dorset	30.3	25
Buckinghamshire	37.7	6	London	30.3	26
Coventry and Warks.	36.5	7	West of England	30.3	27
Thames Valley Berkshire	36.5	8	Derby, Nottingham etc.	29.6	28
South East Midlands	36.3	9	Lancashire	29.4	29
Worcestershire	35.8	10	South East	29.3	30
Humber	34.4	11	New Anglia	29.2	31
Hertfordshire	34.3	12	Greater Manchester	27.4	32
Gloucestershire	34.2	13	Stoke-on-Trent and Staffs	26.9	33
Leeds City Region	34.0	14	Cornwall, Isles of Scilly	26.3	34
Cheshire and Warrington	33.5	15	Greater Lincolnshire	25.7	35
The Marches	33.5	16	Leicester, Leicestershire	25.6	36
Gtr. Birmingham, Solihull	33.4	17	York, N. Yorks, E. Riding	23.8	37
Enterprise M3	33.1	18	Cumbria	22.1	38
Liverpool City Region	31.5	19	Tees Valley	21.1	39
Heart of the South West	31.3	20			

Figure 6: Collaboration for innovation by local economic area (% of firms)



4. INNOVATION OUTCOMES AND SALES

4.1 Product and Service Innovation

The ability to successfully introduce new or improved products and services is a key aspect of firms' innovation capability. Previous research studies have strongly linked new product innovation to both growth and productivity improvements. This metric measures the percentage of enterprises in each locality introducing either a new or significantly improved product or service during the three-year period from 2014 to 2016. The higher the percentage the more firms in any locality are engaging with innovation with its potential growth and productivity benefits.

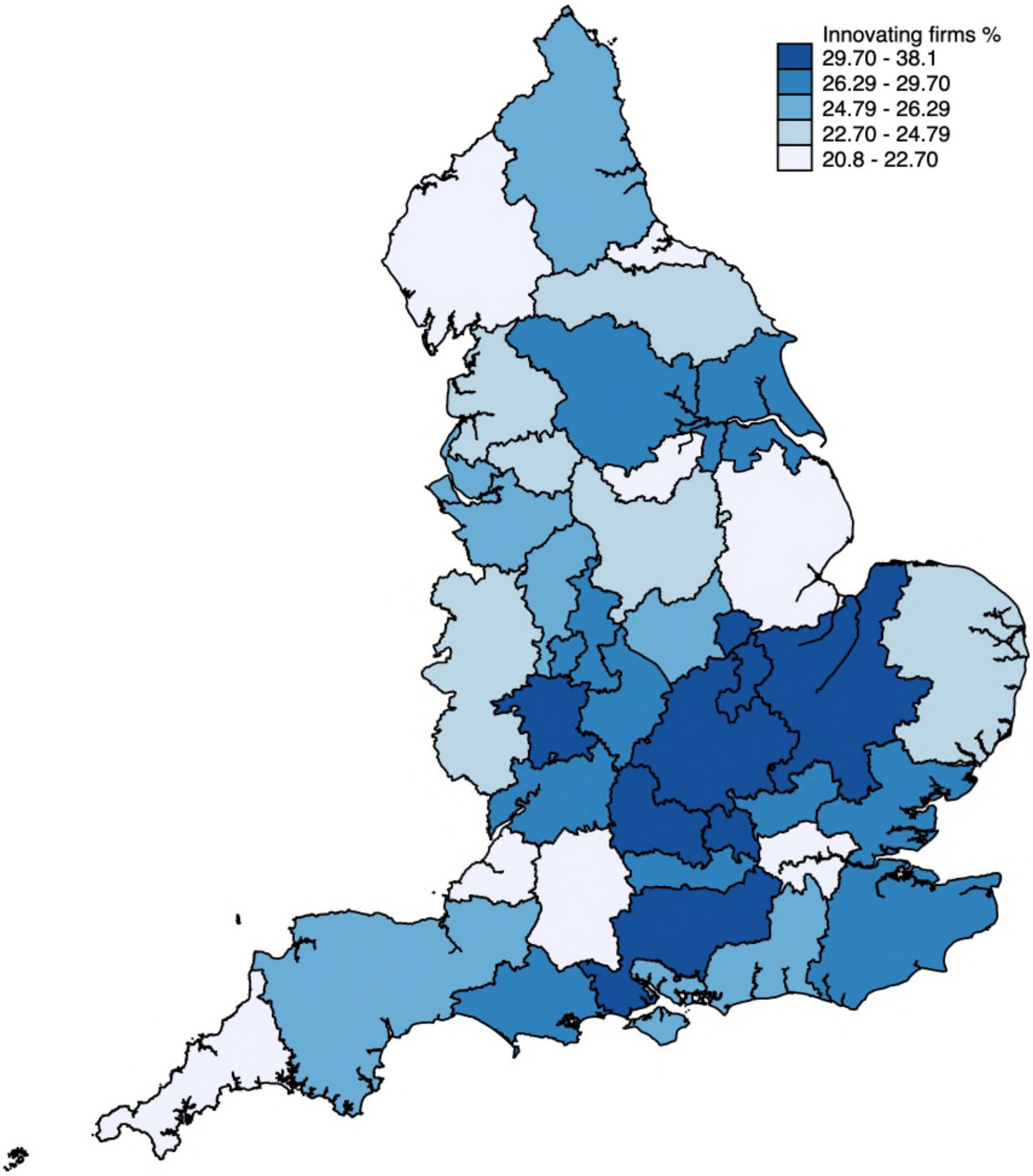
Differences in the levels of this metric between local areas will reflect both the innovativeness of local firms and to some extent the structure of local industries. For example, high-tech industries, or those where there is a high degree of competition, may have higher levels of innovative activity. Similarly, as larger firms are typically more likely to introduce new or improved products or services in any given period, those local areas where there is a preponderance of larger firms are likely to perform well on this benchmark.

As in our 2017 benchmarks, some of the highest levels of product and service innovation activity are recorded in areas North of the M25 and along the M4 Corridor defining the 'arc of innovation' with most surrounding areas also having relatively high levels of innovative activity. Lower levels of product and service innovation are generally associated with more peripheral and coastal areas (Figure 7).

Table 7: The proportion of firms undertaking product or service innovation (% of firms)

LEP	% firms	Rank	LEP	% firms	Rank
Buckinghamshire	38.1	1	Cheshire and Warrington	25.0	21
Northamptonshire	37.8	2	Heart of the South West	25.0	22
South East Midlands	35.1	3	Solent	25.0	23
Worcestershire	32.7	4	North East	24.8	24
Gtr Cambs, Gtr P'borough	31.6	5	Stoke-on-Trent and Staffs	24.8	25
Oxfordshire	30.9	6	Greater Manchester	24.2	26
Enterprise M3	29.9	7	Lancashire	24.1	27
Coventry and Warks.	29.7	8	York, N. Yorks, E. Riding	23.9	28
Black Country	28.5	9	The Marches	23.2	29
Thames Valley Berkshire	28.4	10	Derby, Nottingham etc.	22.8	30
Dorset	28.1	11	New Anglia	22.8	31
Gloucestershire	28.0	12	London	22.7	32
Hertfordshire	26.7	13	West of England	22.6	33
Humber	26.4	14	Sheffield City Region	22.1	34
Gtr. Birmingham, Solihull	26.3	15	Swindon and Wiltshire	21.8	35
Leeds City Region	26.3	16	Cornwall, Isles of Scilly	21.6	36
South East	26.3	17	Cumbria	21.3	37
Coast to Capital	26.1	18	Greater Lincolnshire	20.9	38
Liverpool City Region	25.6	19	Tees Valley	20.8	39
Leicester, Leicestershire	25.3	20			

Figure 7: Product and Service Innovation by Local Area (% firms)



4.2 New to the market innovation

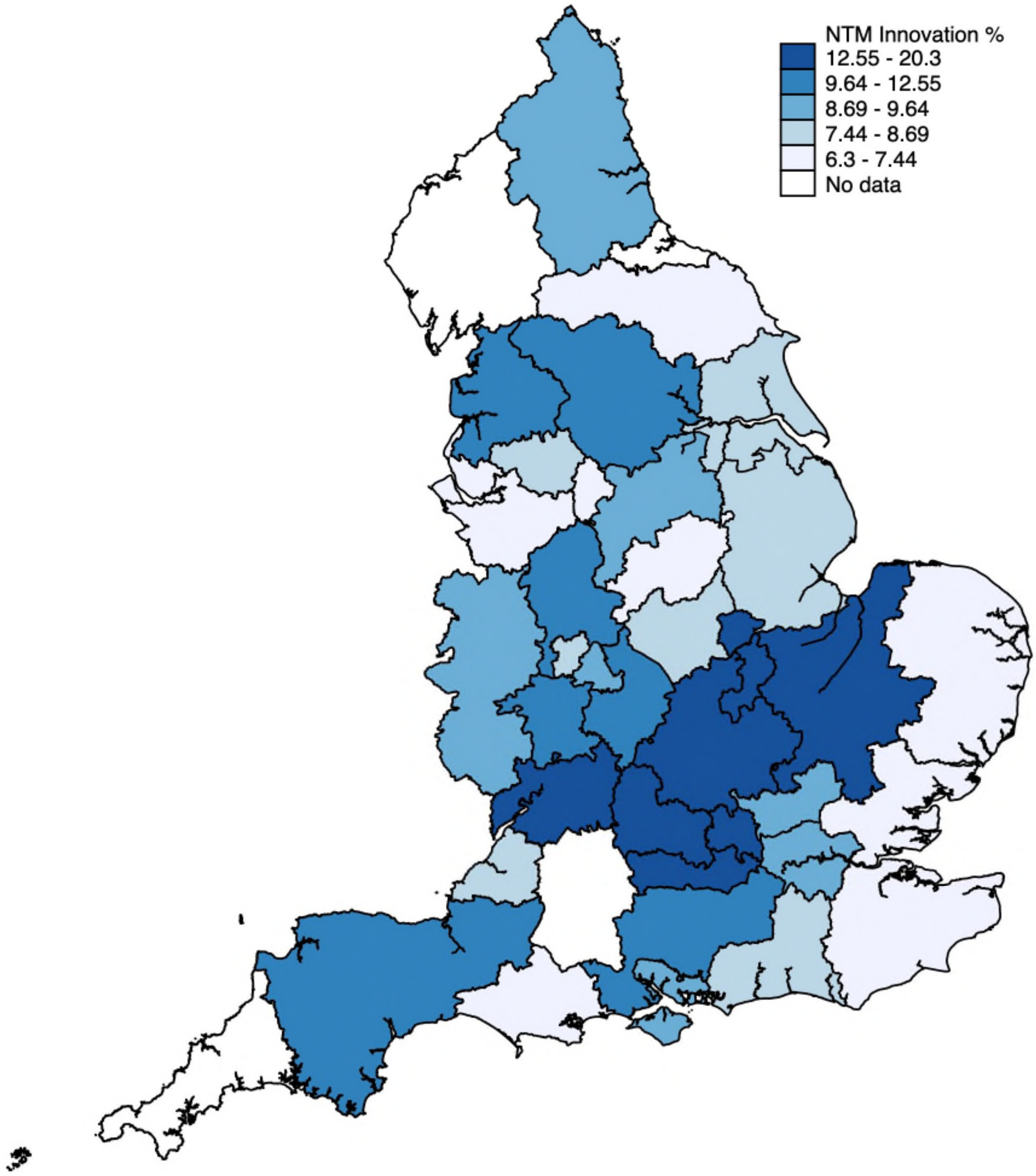
The previous metric provided an indication of the extent of innovation in products and services across the whole population of firms within each locality. Innovations vary in nature, however, with a usual distinction being ‘new to the market’ or ‘new to the firm’. It is generally thought that more radical ‘new to the market’ innovations might generate higher returns although these are offset by the potential for higher risks. This metric provides an indication of the percentage of firms which reported introducing new to the market innovations (either products or services) during the 2014 to 2016 period. As this proportion is relatively small the benchmark is unavailable for some more rural areas due to confidentiality constraints.

To understand this benchmark it is useful first to consider the situation on one specific area. Take Oxfordshire, for example, where 30.9 per cent of firms reported undertaking some product or service innovation between 2012 and 2014 (Table 7). Over the same period 20.3 per cent of firms in Oxfordshire (around two-thirds of all innovating firms) reported undertaking new-to-the-market innovation (Table 8), the highest proportion of any local area. Areas such as Greater Manchester had both lower levels of overall innovation (24.2 per cent of firms, Table 7) and new-to-the-market innovation (8 per cent, Table 8). More generally, eight of the ten best performing local areas in terms of new-to-the-market innovation, were also in the ten best performing areas in terms of their overall innovation performance.

Table 8: New to the market product and service innovation by Local Area (% firms)

LEP	% firms	Rank	LEP	% firms	Rank
Oxfordshire	20.3	1	Sheffield City Region	8.8	21
Northamptonshire	19.7	2	Coast to Capital	8.6	22
Buckinghamshire	16.0	3	Leicester, Leicestershire	8.3	23
Gtr Cambs, Gtr P’borough	15.4	4	Greater Manchester	8.0	24
South East Midlands	15.3	5	West of England	8.0	25
Gloucestershire	14.2	6	Black Country	7.6	26
Thames Valley Berkshire	12.7	7	Greater Lincolnshire	7.6	27
Enterprise M3	12.4	8	Humber	7.5	28
Coventry and Warks.	12.2	9	Dorset	7.4	29
Lancashire	11.2	10	Derby, Nottingham etc.	7.2	30
Leeds City Region	10.7	11	South East	6.9	31
Stoke-on-Trent and Staffs	10.6	12	New Anglia	6.8	32
Heart of the South West	10.1	13	Cheshire and Warrington	6.7	33
Worcestershire	9.7	14	Liverpool City Region	6.5	34
Hertfordshire	9.6	15	York, N. Yorks, E. Riding	6.3	35
London	9.2	16	Cornwall, Isles of Scilly	na	na
Gtr. Birmingham, Solihull	9.1	17	Cumbria	na	na
North East	9.1	18	Swindon and Wiltshire	na	na
Solent	9.1	19	Tees Valley	na	na
The Marches	8.8	20			

Figure 8: New to the market innovation by innovating firms (% of firms)



4.3 Sales of innovative products/services

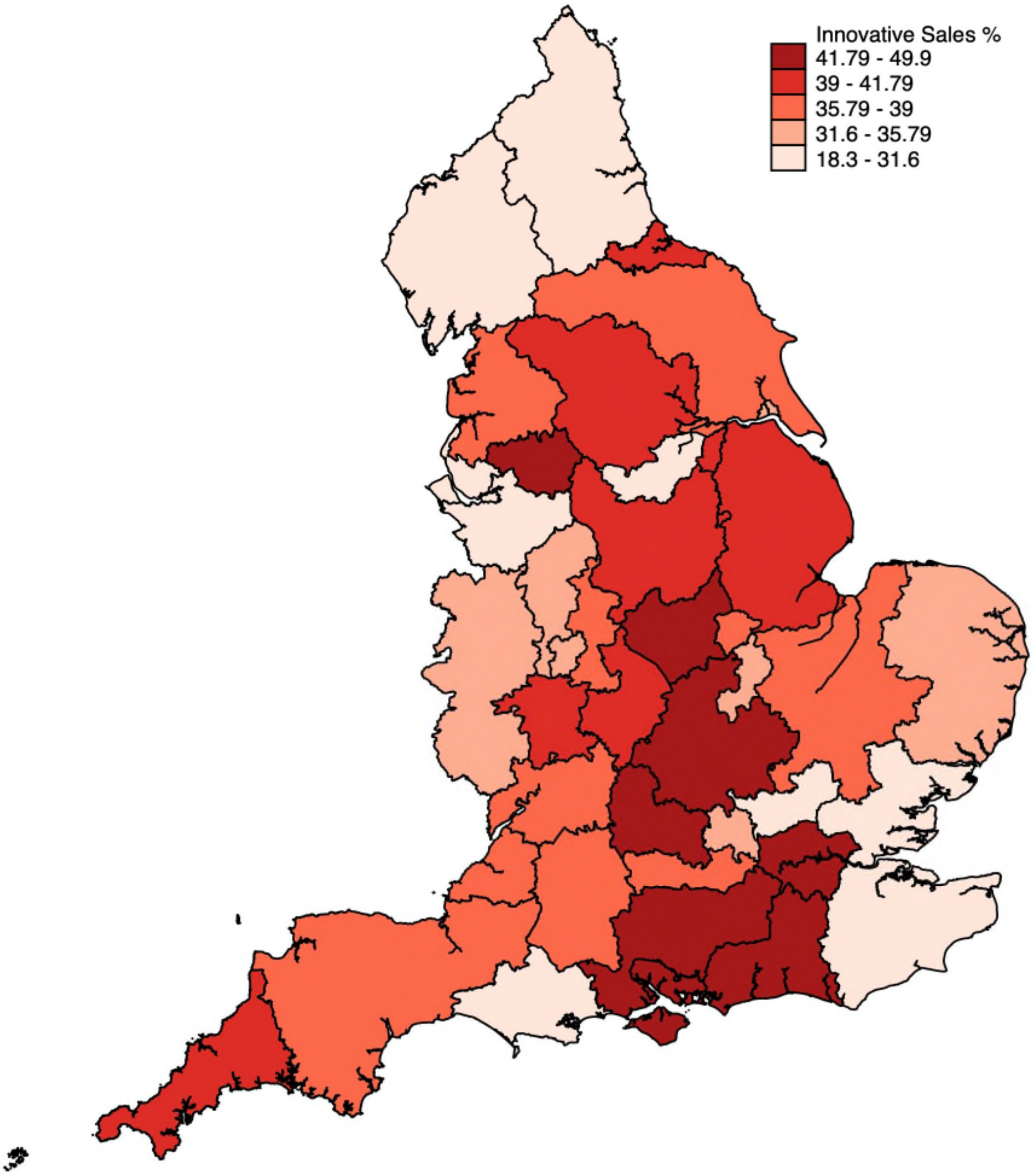
Previous benchmarks have related to the engagement of firms in each local area with aspects of innovation. In other words, they provide an indication of the extent of innovative activity in the population of firms. This benchmark, relating to the proportion of innovating firms' sales which are derived from innovative products or services, is different in providing a measure of the short-term success of firms' innovation. The benchmark is measured as the average proportion of firms' sales derived from innovative products or services (i.e. new or significantly improved) and introduced during the previous three years. The metric is based on the proportion of innovative sales over the year prior to the survey and relates only to innovating firms.

A number of local areas which perform well on this benchmark (Table 9) also perform well in terms of the proportion of innovating firms and new-to-the-market innovation. The implication is that in those areas where the proportion of innovating firms and new to the market innovators is relatively high, local firms are also relatively successful innovators.

Table 9: Sales of innovative products and services by Local Area (% sales of innovating firms)

LEP	% firms	Rank	LEP	% firms	Rank
Oxfordshire	49.9	1	Lancashire	36.5	21
Greater Manchester	48.9	2	York, N. Yorks, E. Riding	36.4	22
South East Midlands	46.6	3	Gloucestershire	35.8	23
Leicester, Leicestershire	45.0	4	Gtr. Birmingham, Solihull	35.8	24
Enterprise M3	44.3	5	Northamptonshire	35.3	25
Solent	43.8	6	Buckinghamshire	34.6	26
Coast to Capital	42.4	7	Humber	33.8	27
London	41.8	8	The Marches	32.4	28
Tees Valley	41.5	9	Black Country	32.2	29
Leeds City Region	41.3	10	New Anglia	32.1	30
Worcestershire	41.3	11	Stoke-on-Trent and Staffs	32.0	31
Cornwall, Isles of Scilly	41.0	12	Liverpool City Region	31.6	32
Derby, Nottingham etc.	41.0	13	Dorset	31.2	33
Greater Lincolnshire	40.5	14	Hertfordshire	28.7	34
Coventry and Warks.	39.9	15	North East	27.7	35
West of England	39.0	16	South East	27.3	36
Gtr Cambs, Gtr P'borough	38.6	17	Cheshire and Warrington	27.1	37
Swindon and Wiltshire	38.4	18	Sheffield City Region	22.4	38
Thames Valley Berkshire	38.1	19	Cumbria	18.3	39
Heart of the South West	37.3	20			

Figure 9: Sales of innovative products and services by Local Area (% sales of innovating firms)



4.4 Process innovation

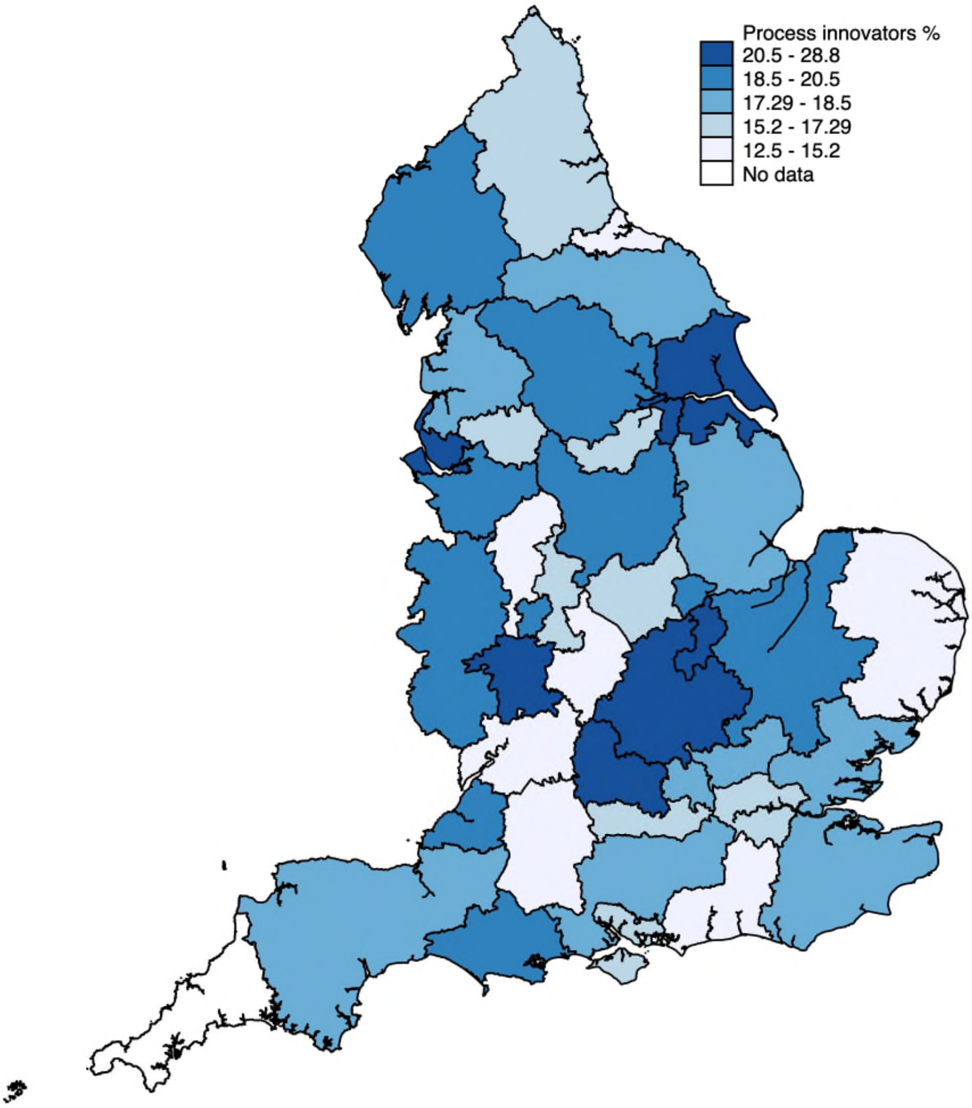
Alongside product and service innovation it is usual to measure firms' innovation in manufacturing or business processes. Either type of innovation may provide advantages in terms of flexibility, productivity or cost saving. Process changes have also been linked by previous research to quality improvements and firms' improved ability to develop new product and service innovations. The metric we report here is similar in nature to that for product or service change and relates to the percentage of firms in each local area introducing new or significantly improved processes during the 2014 to 2016 period.

Overall, the proportion of firms reporting that they undertook process change is a little lower than that for product or service innovation (Figure 7). The geography of process innovation is more diverse than that of product and service innovation, however, with some of the leading areas in terms of product/service innovation performing less well on this benchmark (e.g. Greater Cambridge). There is, however, a positive correlation between product/service innovation and process change (0.50) but a stronger relationship between process change and collaboration (0.58).

Table 10: Process innovation by local economic area (% of firms)

LEP	% firms	Rank	LEP	% firms	Rank
Northamptonshire	28.8	1	South East	17.6	21
Oxfordshire	23.8	2	Hertfordshire	17.4	22
Humber	23.3	3	Heart of the South West	17.3	23
Worcestershire	23.2	4	Thames Valley Berkshire	16.9	24
Liverpool City Region	21.7	5	Gtr. Birmingham, Solihull	16.5	25
South East Midlands	20.7	6	Solent	16.5	26
Cumbria	20.5	7	Greater Manchester	16.0	27
Dorset	20.5	8	North East	16.0	28
Black Country	19.9	9	Sheffield City Region	15.8	29
West of England	19.7	10	Leicester, Leicestershire	15.6	30
Leeds City Region	19.6	11	London	15.2	31
Cheshire and Warrington	19.4	12	Coast to Capital	14.8	32
Derby, Nottingham etc.	19.4	13	Stoke-on-Trent and Staffs	14.6	33
The Marches	19.2	14	Swindon and Wiltshire	14.3	34
Gtr Cambs, Gtr P'borough	18.7	15	Gloucestershire	14.0	35
Lancashire	18.5	16	Coventry and Warks.	13.0	36
Buckinghamshire	18.3	17	New Anglia	12.5	37
York, N. Yorks, E. Riding	18.3	18	Tees Valley	12.5	38
Enterprise M3	17.9	19	Cornwall, Isles of Scilly	na	na
Greater Lincolnshire	17.6	20			

Figure 10: Process innovation by local economic area (% of innovating firms)



5. CONCLUSIONS

Innovation is important as it both contributes to productivity and provides the basis for business growth through the development of new export market opportunities. Research has also linked innovation positively to resilience: innovating firms are more likely to be able to adjust when market conditions become more challenging. The benchmarks we report here, based on a new analysis of the UK Innovation Survey 2017, provide an indication of the distribution of innovation activity across local areas in England.

Our analysis suggests three key results:

- Reflecting the results of our earlier analysis of the 2015 UK Innovation Survey, we find a concentration of relatively high levels of product and service innovation and new-to-the market innovation in an arc of local economic areas in the South and East Midlands and along the M4 corridor. Albeit with some variation, these areas are characterised by high proportions of innovating firms, a high incidence of new-to-the-market innovation, and relatively high levels of revenue from innovation.
- We observe a rather different geography in terms of process innovation with higher levels of process innovation activity in some Northern and peripheral areas where product/service innovation is less common.
- Our benchmarks for organisational innovation suggest a rather less clear geographical pattern with a range of different local areas performing relatively strongly. Areas in the ‘arc of innovation’ also tend to perform relatively strongly on these metrics too however.

Our analysis highlights the diversity of innovation activity across the UK. Some local areas are marked by strengths in organisational innovation but weaker elsewhere; others exhibit higher levels of collaborative behaviour and R&D. Both suggests the value of differentiated local innovation strategies which can build on existing strengths and remedy weaknesses.

Two important caveats need to be borne in mind when considering these results. First, as mentioned previously, the level of innovative activity in a locality will depend both on the type of business activity in the area as well as the innovativeness of individual firms.

Second, it is also important to remember that our benchmarks are based on survey data. This inevitably means that our results are subject to some measurement error although the general picture we observe in 2014 to 2016 is reassuringly similar to that for earlier periods. In future, if more precise local benchmarks are desired, larger surveys or different analytical approaches will be needed.

Finally, while our benchmarks provide an overview of the geography of innovation across England they also raise questions about ‘why’ this pattern arises. Addressing this question is likely to require more detailed statistical and institutional analyses of the drivers of innovation at the local level. Only in this way will we be clear about the impact and effectiveness of different elements of the business eco-system on local innovation outcomes.

Annex 1: Methodological notes

The metrics reported here are derived primarily from the UK Innovation Survey (UKIS) wave 10 – UKIS 2017 - covering the period 2014 to 2016. The survey covered enterprises with 10 or more employees in sections C-K of the Standard Industrial Classification (SIC) 2007 and therefore omits primary sectors. The survey was conducted between February and October 2017 and valid responses were received from 13,194 enterprises across the UK, a response rate of 43 per cent[1].

Two main steps have been necessary to develop local innovation benchmarks from the original survey data file. First, postcodes on the UKIS are matched to the UK postcode directory in order to link individual observations to local areas. Benchmarks are reported for 39 local economic areas in England to allow comparability with our 2013 and 2015 analysis.

Second, as the UKIS is a structured survey with higher sampling rates among larger firms it is also necessary to weight observations to ensure that the results are representative of each local area. To do this we profiled the population of firms in each local area using the 2017 Business Structures Database and then developed new weights to gross observations in each local area to the local firm population. Weights for each local economic area were developed to reflect three broad sectors and four enterprise size bands. Where firms were located in an area covered by more than one LEP they are included in the benchmark for each overlapping LEP.

Two further points are worth making in relation to the local innovation benchmarks presented here. This is secondary analysis – using the UKIS survey for a purpose for which it was not originally intended – and the results must therefore be considered in this light. In particular, the UKIS was originally structured to be representative of Government Office regions in England (rather than Local Economic Areas). We are therefore extending the use of the data beyond its original design in undertaking this analysis. Having said this, it turns out that (un-weighted) observation numbers for most LEAs (except some of the smaller rural LEAs) are reasonable and that the resulting weights are very similar across LEAs (see Table A1). Nonetheless the use of survey data suggests that all of our estimates are subject to sampling error and we report 95 per cent margins of error in Table A2 for each Local Economic Area and metric. Table A3 reports the correlations between metrics. Second, before release for publication, data have also been checked for 'disclosure', i.e. the ability of an interested party to identify any individual business from published data. This results in a small number of results which are unavailable particularly for rural LEAs where the number of firms undertaking innovation is relatively small.

[1] See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/750530/uk_innovation_survey_report_2017_FINAL.pdf.

Data acknowledgement

The statistical data used here is from the Office of National Statistics (ONS) and is Crown copyright and reproduced with the permission of the controller of HMSO and Queens Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. The analysis upon which this paper is based uses research datasets which may not exactly reproduce National Statistics aggregates.

Table A1: Unweighted sample numbers by Local Economic Area (no of firms)

Black Country	186	Leicester	202
Buckinghamshire	113	Liverpool City Region	205
Cheshire and Warr.	187	London	3911
Coast to Capital	330	New Anglia	593
Cornwall and Isles	114	North East	279
Coventry etc.	161	Northamptonshire	131
Cumbria	100	Oxfordshire	143
Derby, Derbyshire,	355	Sheffield City Region	447
Dorset	140	Solent	208
Enterprise M3	315	South East	1351
Gloucestershire	131	South East Midlands	474
Greater Birmingham	355	Stoke-on-Trent	288
Greater Cambridge	278	Swindon	120
Greater Lincolnshire	171	Tees Valley	86
Greater Manchester	519	Thames Valley	190
Heart of the SW	309	The Marches	124
Hertfordshire	431	West of England	210
Humber	185	Worcestershire	187
Lancashire	261	York, North Yorks	306
Leeds City Region	539		

Source: UKIS 2017, ERC Analysis

Table A2: Margins of error by LEA and metric

	Business Practices	Work Org.	Market-ing	R&D	Design	Coop-eration	Product/ Service Innov.	Radical Innov	Innov. Sales	Process innov
Black Country	6.1	6.6	5.5	6.2	4.9	7.1	6.6		6.8	5.8
Buckinghamshire	8.1	7.9	7.2	7.3	6.5	9.0	9.0	6.8	8.9	7.2
Cheshire and Warr.	6.3	5.8	5.2	5.8	4.3	6.8	6.3	3.6	6.4	5.7
Coast to Capital	4.6	4.4	4.1	4.5	3.9	5.0	4.8	3.1	5.4	3.9
Cornwall and Isles	7.1	6.2	0.0	6.8	0.0	8.2	7.6		9.1	0.0
Coventry etc.	7.2	6.3	6.0	7.0	6.2	7.5	7.1	5.1	7.6	5.2
Cumbria	8.3	6.8	6.7	7.3		8.2	8.1		7.7	8.0
Derby, Derbyshire,	4.5	4.4	3.8	4.1	3.8	4.8	4.4	2.7	5.2	4.2
Dorset	6.8	6.5	5.8	6.7	5.4	7.7	7.5		7.8	6.8
Enterprise M3	4.9	4.5	3.7	4.8	3.9	5.2	5.1	3.7	5.5	4.3
Gloucestershire	7.3	7.7	6.7	7.5		8.2	7.8	6.0	8.3	6.0
Greater Birmingham	4.4	4.4	4.0	4.5	3.8	5.0	4.6	3.0	5.0	3.9
Greater Cambridge	5.0	4.9	3.9	5.3	4.1	5.9	5.5	4.3	5.8	4.6
Greater Lincolnshire	5.8	5.0	0.0	5.5	3.7	6.6	6.2		7.4	5.8
Greater Manchester	3.5	3.4	2.9	3.6	2.7	3.9	3.7	2.4	4.3	3.2
Heart of the SW	4.6	4.6	3.9	4.6	3.2	5.2	4.9		5.4	4.3
Hertfordshire	3.9	4.1	3.5	4.0	3.4	4.5	4.2	2.8	4.3	3.6
Humber	4.8	5.4	4.7	5.0	4.2	6.9	6.4		6.9	6.2
Lancashire	5.2	4.7	4.4	5.1	4.4	5.6	5.2	3.9	5.9	4.8
Leeds City Region	3.7	3.5	2.9	3.5	2.7	4.0	3.8	2.6	4.2	3.4
Leicester	5.8	5.4	4.8	5.9	4.5	6.1	6.1	3.8	6.9	5.1
Liverpool City Region	6.1	5.1	4.8	5.8	4.2	6.4	6.0		6.4	5.7
London	1.3	1.3	1.1	1.3	1.0	1.5	1.3	0.9	1.6	1.1
New Anglia	3.6	3.1	2.6	2.9	2.9	3.7	3.4	2.0	3.8	2.7
North East	5.0	4.2	4.0	4.7	3.8	5.5	5.1	3.4	5.3	4.3
Northamptonshire	7.9	7.7	7.3	8.3	6.5	8.6	8.4	6.9	8.3	7.8
Oxfordshire	7.1	7.4	7.0	8.1	6.2	8.3	7.7	6.7	8.3	7.1
Sheffield City Region	6.0	5.2	4.8	5.5	4.2	6.3	5.7	3.9	5.7	5.0
Solent	2.4	2.1	1.7	2.3	1.9	2.5	2.3	1.5	2.7	2.0
South East	3.9	3.6	3.0	3.6	2.7	4.1	4.0	2.3	4.1	3.5
South East Midlands	5.1	5.1	4.6	5.3	4.1	5.6	5.6	4.2	5.8	4.7
Stoke-on-Trent	7.3	6.9	5.2	6.2	6.1	8.0	7.8	5.6	8.4	6.4
Swindon	10.4	8.9	7.3	8.6	8.6	10.4	8.8	0.0	10.4	7.5
Tees Valley	5.7	5.7	0.0	0.0	0.0	5.9	5.8		7.1	4.8
Thames Valley	7.6	7.6	6.6	8.0	6.5	8.6	8.0	5.9	8.6	6.7
The Marches	5.9	5.2	4.2	5.2	4.6	6.4	5.8	3.9	6.4	5.4
West of England	6.2	5.3	4.6	6.1	4.6	6.7	6.1	3.9	7.1	5.8
Worcestershire	5.2	4.4	4.2	4.9		5.4	5.3		5.6	4.8
York, North Yorks	4.0	3.7	3.1	3.6		4.0	4.0		4.5	3.6

Table A3: Correlations between metrics

	Business Practices	Work Org.	Market-ing	R&D	Design	Coop-eration	Product Innov.	Radical Innov	Innov. Sales	Process
Business practices	1.00									
Work Organisation	0.14	1.00								
Marketing	0.31	0.77	1.00							
R&D	0.47	0.62	0.75	1.00						
Design	0.38	0.56	0.58	0.52	1.00					
Cooperation	0.29	0.68	0.68	0.75	0.43	1.00				
Product/service innov	0.36	0.57	0.64	0.60	0.38	0.73	1.00			
Radical innovation	0.31	0.63	0.66	0.75	0.59	0.78	0.76	1.00		
Innovative sales	0.12	0.26	0.22	0.48	0.29	0.13	0.22	0.36	1.00	
Process innovation	0.10	0.25	0.39	0.43	-0.12	0.58	0.50	0.35	0.07	1.00

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