

# D2.3 Segmentation Methodology

# &

# D2.4 Segmentation Report

<b>Deliverable due date: March 2019</b>	<b>Actual submission date: October 2019</b>
<b>Start date of project: 15 December 2017</b>	<b>Duration: 22 months</b>
<b>Lead beneficiary for this deliverable: INVENTYA</b>	<b>Revision: 2.1</b>

<b>Nature: R</b>	<b>Dissemination Level: PU</b>
R = Report E = Ethics P = Prototype D = Demonstrator O = Other W = Website, patents, filling, etc.	PU = Public PP = Restricted to other programme participants (including the Commission Services) RE = Restricted to a group specified by the consortium (including the Commission Services) CO = Confidential, only for members of the consortium (including the Commission Services)



This project has received funding from the European Union's Horizon 2020 research & innovation programme under grant agreement No. 777439

<b>Contributors</b>	
<b>Name</b>	<b>Organization</b>
<b>Valerie De Leonibus</b>	Inventya Ventures
<b>Ryan Makin</b>	Inventya Ventures
<b>Ginny Chen-Jorgensen</b>	Inventya Ventures

<b>Peer Reviewers</b>	
<b>Name</b>	<b>Organization</b>
<b>Catherine Thomas</b>	LSE
<b>Dennis Verhoeven</b>	Imperial College/LSE
<b>Suzanne Hamilton</b>	Stakeholder Panel
<b>Rasa Gofman</b>	Stakeholder Panel

<b>Revision History</b>		
<b>Version</b>	<b>Date</b>	<b>Modifications</b>
<b>1.0</b>	20/09/2019	Original Draft
<b>2.0</b>	14/10/2019	Edited to accommodate Partner review comments
<b>2.1</b>	23/10/2019	Edited to accommodate Stakeholder Panel comments

(page intentionally blank)

## 1 *Executive Summary*

Market segmentation is well established as a theory but remains challenging when dealing with innovation as no consensus exist on how to benchmark innovation activities. SME policy interventions have shown attempts at segmentation, some quite sophisticated. However, there is now evidence that segmentation needs to be based on value and requirements rather than administrative definitions such as size and sector. Having a segmentation that identifies the best SMEs can improve the incentives made available, support the development of customised marketing messages and help focus on the opportunities that can provide the best return on investment for the public sector.

The objective is therefore to create a segmentation that is easy to use and replicate, through the development of a simple quality score. Complex segmentation methodologies are unlikely to be used unless organisations work with segmentation specialists.

There are a number of approaches to segmentation. The simplest one classifies SMEs according to publicly available characteristics such as industry and company size. SMEs segmentation can also be based on their needs. However, the value that would be created by supporting a group of SMEs must also be considered to ensure best value for money. Value can translate into economic profitability, employment, social and environmental impact or a combination of these.

The purpose of the segmentation is to identify common characteristics that define the ‘good’ innovative SMEs; the ones that if they benefit from incentives and support will translate into value. A key challenge however in developing the segmentation was found to be access to key data that could represent the abilities of SMEs to translate support into economic value. Therefore, a set of simple variables were identified that could be used to develop a modern version of the ‘innovation count’, incorporating commercialisation aspects into it. The variables were then used to produce a quality score.

Data was collected through an online survey questionnaire across ten European countries. Following a lightweight clustering analysis, four segments were identified and tested. The data gathered as part of the survey was then used to create a profile of the four segments. The ‘groundbreakers’ are found to be the most innovative SMEs, producing strong, patentable IP that they successfully commercialise. They are the largest recipients of R&D incentives. The ‘conservatives’ take more calculated risks but are the most successful at introducing new business models. Their innovation is not as strong, limiting their opportunities for patenting but also to access funding, making them the most dissatisfied with government R&D funding. The ‘casuals’ undertake innovation but don’t necessarily commercialise it. They are unsure of what R&D incentives are, find them complicated and time consuming. The ‘traditionalists’ are the lowest innovators in R&D. They innovate on an ad-hoc basis and don’t generally use either public or private R&D finance.

The ‘conservatives’ are the neglected SMEs because their innovation is not sufficiently strong to be patentable and ground-breaking. Further research is suggested to better understand how measures specifically targeted at this segment could boost value creation for these SMEs. A focus could be the identification of methods to support business model innovation.

## *Table of Contents*

1	Executive Summary.....	4
2	Objectives.....	6
3	Segmentation definition and identification.....	7
3.1	Why segment SMEs.....	7
3.2	Approaches to SME segmentation for innovation.....	7
3.3	Criteria for a desirable segment.....	8
3.4	Segmentation Variables and Hypotheses.....	8
4	Collecting Primary Data – development of the dataset.....	12
4.1	Questionnaire Design.....	12
4.2	Data collection.....	13
5	Analysis and Segmentation of the dataset.....	14
6	Testing of the segmentation.....	15
7	Segment profiles.....	29
7.1	High Innovation Output Segment – ‘The Groundbreakers’.....	29
7.2	Above Average Innovation Output Segment – ‘The Conservatives’.....	31
7.3	Below Average Innovation Output Segment – ‘The Casuals’.....	32
7.4	Low/No Innovation Output Segment – ‘The Traditionals’.....	33
8	Discussion and conclusions.....	36
9	References.....	38

## 2 Objectives

Market segmentation is well established as a theory and widely applied by organisations. However, developing and implementing segmentation schemes remains challenging, particularly when dealing with innovation.

Innovations are intangible, takes many forms and are scattered across a variety of industries. Consequently, innovations are extremely difficult to measure and still there is no consensus on how to measure innovative activities.

At the same time, most SMEs are not high tech, disruptive innovators, scale-ups, rapidly growing or new. Instead, the majority of SMEs are ‘regular’ established companies. Their focus is on incremental rather than radical innovation.

SME policy interventions have shown some attempts at segmentation. Some such as used by Business Links in the UK have been quite sophisticated. However, there is now evidence that segmentation needs to be based on customer requirements rather than administrative definitions such as size or sector.

The objective is thus to create a methodology for SME segmentation, which can discern the trends and different innovations being carried out by SMEs. Very importantly, the segmentation model must consider SME needs to deliver impact.

The objective is to create a segmentation that is simple to use and replicate. Complex segmentation methodologies are less likely to be implemented by organisations providing incentives or support to SMEs unless they work with a segmentation specialist. Our objective was thus to identify a simple quality score that could help segment SMEs quickly.

Specifically, the key objectives of this report are to deliver the following:

- Develop survey questionnaires to gather bespoke data that can be used to develop a realistic segmentation of innovating SMEs including new parameters
- Develop a bespoke dataset based on data gathered through questionnaires and online surveys.
- Develop, test and profile the identified segments of innovative SMEs

### 3 Segmentation definition and identification

#### 3.1 Why segment SMEs

Without any knowledge of how the innovative SME market is segmented means that targeting the best SMEs with the right type of support is unlikely to be achieved satisfactorily.

Without a deep understanding of how innovative SMEs are segmented, incentives and support are likely to lack focus, making it more difficult to efficiently allocate resources into targeting those SMEs. Furthermore, a lack of understanding of what would be the best SME to focus on can cause diffused go-to-market and support development strategies that hamper governments and public organisations' ability to fully engage with the SME segments that are most likely to create impact.

Having a best SME segmentation in place can impact by:

- Improving the incentives made available to SMEs for innovation
- Focusing marketing messages that are customised to each of SME segment
- Allowing focus on the opportunities that can provide the best return on investment for support organisations

#### 3.2 Approaches to SME segmentation for innovation

There are different approaches to segmentation:

- ***A priori segmentation*** - this is probably the most common approach used to segment SMEs as it is the simplest approach. This consists in classifying SMEs based on publicly available characteristics such as industry and company size. However, the challenge with this methodology is that SMEs in the same industry and size may have different needs
- ***Needs-based segmentation*** - this approach differentiates SMEs based on their needs. For example, SMEs can be divided based on their position in the innovation lifecycle. This assumes that they have different needs at different stages from start-up to internationalisation. The challenge with this methodology is that incentives and support may be provided to SMEs that do have similar needs, but the R&D efforts do not necessarily correlate into impact. There is a risk to focus the support on SMEs that are 'incentives' junkie but do not translate any R&D into economic value.
- ***Value-based Segmentation*** - this approach differentiates SMEs based on their economic value. SMEs with the same value level can be grouped into individual segments that can be distinctly created. Identifying high growth SMEs is one of the most common approaches to this segmentation as high growth SMEs are expected to be the companies providing the greatest impact and return on investment. For this reason, policy makers often target companies with high growth potential, where the impact of the incentive/support may be particularly strong. However, research has shown that growth processes are often random and unpredictable, making the identification of high growth businesses exceedingly difficult.

Clearly, there are drawbacks with most of the segmentation approaches currently used. There is the need for a simple segmentation methodology that can be based on value and impact but that does not just rely on the impossible task of identifying high growth SMEs.

For the segmentation approach to be used by organisations, it must be simple and easy to implement. There are many players that provide support and incentives to innovative SMEs some of the largest such as government, but some involved, such as SMEs are unlikely to recourse to complex segmentation methodologies that require external experts.

### 3.3 Criteria for a desirable segment

Kotler in 1967 originally identified a set of criteria for a desirable segment and these are still the most commonly used. A desirable segment of innovative SMEs would be characterised by the following:

- **Measurable** - The segment should be measurable in terms of its size (number of SMEs within the segment) or in terms of economic value (e.g. value of the SME segment to the economy such as amount of taxes paid on profit or employment)
- **Accessible** - this translates into the ability to develop suitable and distinctive marketing and support/incentive programmes for this segment.
- **Substantial** - the SME segment must be of a sufficient size and impact potential. For example, focusing only on high growth or scale-up companies means that the support or incentive will be targeted at only a very small number of SMEs. This is fine for high impact and expensive solutions. However, programmes focusing on this minority often end-up loosening up their definition because the segment is not substantial enough to meet policy targets.
- **Actionable** - This is where the resources available to target and serve a SME segment needs to be considered. This is where the smart specialisation of regions or countries could come into play.

The role of the segment qualification criteria is to ensure that a segment has distinct SME characteristics, the scale of the impact is worthwhile, the extent to which these features are measurable and whether a specific support programme can effectively target it.

### 3.4 Segmentation Variables and Hypotheses

The segmentation variables can be defined as the objective measures, factors or characteristic to differentiate SME segments, whether they are needs- or value- based.

Developing variables and hypotheses is important as its primary purpose is to provide a framework for the SME segmentation research process. Once we have established a clear hypothesis and the variables that need to be tested, the segmentation process can be started.



The purpose of the segmentation is to identify common characteristics that define the ‘good’ innovative SMEs, the ones that if they benefit from incentives and support will translate it into impact.

To do that well, it is necessary to clearly and objectively define what good means. This can be done by developing a quality score that can be used to objectively rank the SMEs.

### *Defining SME quality or value*

The challenge is to identify these SMEs that can create the most value. In essence, purely focussing on economic aspects, SME value from innovation is the total net present value of the cumulative profits generated by the SME from innovation over its lifetime. The best SMEs would therefore be the ones that generate the most value from innovation over their lifetime. Although past and current data can be available, there is no data available on the future behaviour of SMEs. Therefore, assumptions would need to be made about the future. This can be very challenging to calculate or even approximate, especially for start-ups and rapidly growing companies.

McKinsey suggest classifying innovative SMEs based on simple indicators, emphasising again the importance of simplicity. They have suggested R&D conversion metrics, specifically R&D-to-product (RDP) conversion and new-products-to-margin (NPM) conversion. These components – gross margin, R&D, and sales from new products can provide insights on the relative innovation performance of businesses.

Similarly, R&D incentives conversion metrics could be developed that assess how well an organisation performs in translating the public support incentives such as R&D tax or grants into profits. In addition to the sales or turnover growth, all the cost associated with supporting these SMEs with innovation would need to be identified to have the net value. This would be an ideal scenario and of course profit could be replaced by social impact in certain cases.

The McKinsey approach could work well for benchmarking larger companies as most of the required financial information is available publicly. However, accessing this data from SMEs is challenging especially at EU level. Unlike larger companies, not all SMEs are required to disclose turnover information. In addition, there are differences in the way company data is captured across Europe.

Such an approach to segmentation could be adopted by organisations that have access to this data. This data may be collected by the European Commission, HMRC or Innovate UK for example.

In addition, SME value for government may not be reflected only in the amount of profit generated. Therefore, employment and social benefits indicators could also be used as they could be equally if not more important.

As there are a number of challenges anticipated with this approach if the data cannot be captured, an alternative, which can be easily replicated was identified.

In the simplest term, SMEs that create impact are the ones that do innovate and commercialise that innovation. It would be expected that the impact will vary depending on the innovation, whether they introduce a brand-new product or service or whether they introduce an improvement of an existing product. In addition, the impact is likely to be greater if they develop strong IP that they can protect and then commercialise. This would represent a more modern version of the ‘innovation count’, incorporating the commercialisation aspects into it.

The objective is therefore to evaluate whether this simple approach to measuring innovation levels can provide good indicators for the segmentation of innovative SMEs.

### *Developing a quality score*

To be able to understand what are the good SMEs that create impact with innovation and the ones that don't produce any impact through innovation, the development of a quality score based on innovation variables is proposed. The quality score will enable SMEs to be ranked and then classified. The quality score should capture enough of the differences between what can be considered poor, average and great innovative SMEs.

The quality score was based on the following innovation outputs:

Question	Score
Introductions between 2015-2017	A grading score was given based on whether they introduced any innovation during this time period or not.
Commercialisation of innovation	A graded score was given based on whether the innovation was commercialised, partly commercialised or not commercialised
Obtaining of inventor certificates/patents	A graded score was given based on whether an inventor certificate or patent was obtained or not
Commercialisation of invention/patent	A graded score was given based on whether the invention/patent was commercialised, partly commercialised or not commercialised.

Depending on the answers, each respondent was given a point score of between 1-4 for each one. The scores were then added together, and we were left with the final score. The higher the score, the higher the innovation output.

### *Developing hypotheses*

To create the segmentation, several hypotheses about the segments were made as a starting point to the research.

A good SME will be one that innovates and commercialise their innovation. If they have a patent or other protection certificate, it would give them an additional strength to compete in the market. The companies that have commercialised this IP would be in the strongest position. Therefore, the score should reflect this.

There should be a maximum of 4 segments based on their level of innovation outputs. The following hypotheses were made and tested.

***High innovation output cluster hypotheses:***

- SMEs with a high innovation output are likely to have a high investment in R&D.
- SMES with high innovation outputs are more likely to be aware of innovation incentives
- More successful at commercialising innovation
- Expected to have collaborated with universities

***Above average innovation output cluster hypotheses:***

- They are likely to introduce innovation but not lead and rather conduct incremental innovation

***Below average innovation output cluster hypotheses:***

- Not as successful in commercialising their IP or innovation
- Likely to invest less in R&D

***Low/No innovation output cluster hypotheses:***

- Less likely to be aware of R&D incentives
- Spend less or not at all in R&D
- Will not commercialise innovation

## *4 Collecting Primary Data - development of the dataset*

The next step in developing the segmentation methodology was to review and collect data that could be used for the segmentation. A review of the data available in the public domain was conducted to develop a data collection strategy.

Data published at SME level is variable across European countries. Company information databases such as Hoovers or Creditsafe provide information on net worth and shareholder funds. Although this can provide an indication on the growth and profitability of an SME, it is not sufficient to understand the level of innovation of a company.

The amount of grant received by companies is not always publicly available. The European Commission and Innovate UK do release information on grants awarded at company level. It is possible that other European countries do release grants distributed to companies but because of language barriers, identifying this information was difficult. With regards to the amount of R&D tax relief received by companies, this is not available in the public domain.

Information about SMEs on innovation outputs such as patents or trademarks is available in the public domain. However, as our segmentation goes beyond these innovation outputs, to understand the type of innovation that SMEs have released and whether it was commercialised can only be achieved through a survey questionnaire.

Therefore, the option to obtain this information is to ask SMEs through a survey as they would be the only ones able to release this data if they wish. Nevertheless, SMEs are often reluctant to partake with financial information and this was emphasised when piloting the questionnaire.

On the other hand, information on the type of innovation released and their commercialisation was easily obtained in a survey.

### **4.1 Questionnaire Design**

A questionnaire was designed to capture the data needed for the segmentation in WP2 as well as the impact report for WP3.

The objective was to develop an online questionnaire to collect data on each of the variable identified. The variables to be used for the quality score as well as those to create a profile of each of the segment.

In collaboration with WP3, a questionnaire with 33 questions was designed. The objective was to ensure that the questionnaire is easy to answer and can be done in less than 15 minutes. The following information was collected through the questionnaire:

1. Year of incorporation of the company
2. Base/headquarter of the company
3. Size of the company
4. Gender of the CEO
5. Industry sector
6. Estimated turnover in 2015,2016 and 2017
7. Business lifecycle
8. Highest level of education of employees
9. Investment in R&D
10. Spending on R&D
11. Status of the R&D activity and investment

12. Awareness of R&D funding opportunities
13. How they became aware of R&D funding schemes
14. Satisfaction with governmental support in R&D funding
15. Have they received R&D Tax relief/incentives for R&D
16. Type of R&D tax relief/incentives received
17. Estimated amount received from R&D tax relief/incentives
18. If they would have carried out R&D activities without the tax relief/incentives
19. Why they have not yet utilised R&D tax incentives
20. Other non-tax related support received
21. Non-public(private) financial support received
22. Estimate amount of funding derived from private support since 2015
23. Product or process innovation introduced
24. How innovation was produced: in-house, outsourced, collaborations
25. Was the innovation commercialised
26. Did the company profit from commercialisation
27. Was IP obtained
28. Was the IP commercialised
29. Was the IP sold or attempted to be sold
30. Did the company profit from the commercialisation of the IP
31. Introduction of a new business model and its impact
32. Use of key enabling technologies in the development
33. Location of key resources for the development

## 4.2 Data collection

A questionnaire was initially created and disseminated across existing network of contacts of Inventya and Kapitalise to collect responses. This served as a pilot of the questionnaire. Following this step, it was agreed that in order to obtain statistically relevant quantitative responses, a survey panel should be used to collect more data. The SurveyMonkey Panel was selected as being the most cost effective while enabling us to target 10 key European countries.

In total, through the survey **896** complete responses were received from SME's based throughout Europe. This was done in two stages. In the first instance, 50 responses per country for the following 10 countries were obtained:

- France
- United Kingdom
- Lithuania
- Denmark
- Ireland
- Spain
- Romania
- Greece
- Netherlands
- Italy

Following this, 100 responses for the following 4 key countries were obtained:

- Romania
- United Kingdom
- Spain

- France

## *5 Analysis and Segmentation of the dataset*

Once the necessary data has been collected the objective is to analyse and validate each of the hypotheses. Numerous permutations to segment the results were tested to determine the most appropriate method that provides the greatest clarity.

### Light weight clustering analysis

Light weight clustering analysis was used to analyse the data and verify the segmentation hypotheses. This involved systematically reviewing the SME ranking as follows:

- Creation of a database with the list of SME identifier and the data fields characterising the SME
- Calculation of the quality score for each of the SME
- Sorting the database according to the quality score
- Systematically going through the list of segmentation hypotheses to check if the correlation between the values in a segmentation hypothesis data field and the quality score

Depending on the answers, each respondent was given a point score of between 1-4 for each question. The scores were tallied to yield the final score. The higher the score, the higher the innovation output. To provide greater granularity to the dataset, the scores were clustered into four segments instead of the conventional High, Average and Low (three) innovative segments. The conventional method would have resulted in a relatively large Average segment that includes companies that have below average innovation outputs and not necessarily attractive to target for a ROI.

The score brackets for four segments are as follows:

- High innovation output - 13-16 points
- Above average innovation output - 9-12 points
- Below average innovation output - 5-8 points
- Low/No innovation output - 1-4 points

### Profiling of the segment

The objective is then to develop profiles of the identified segments, defined by specific values of the segmentation variables. This enables to define actionable segments so that it is practical to target these segments.

When looking at the segments, we are highlighting the differences between the segments in order to communicate the characteristics of the segments clearly.

## 6 Testing of the segmentation

The respondents were segmented into the groups shown above and the answers to each of the questions have been displayed accordingly so that segments can be compared at every level of the survey.

After the segmentation process, the split of respondents between segments can be found in the graph below.

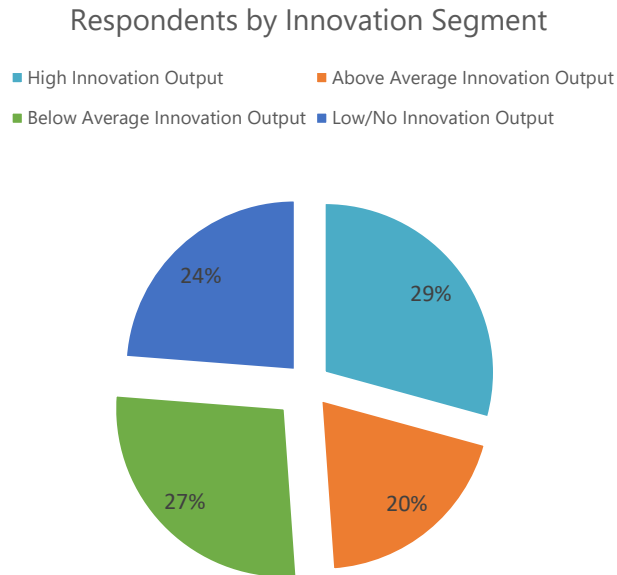


Figure 1 Respondents by innovation segment

### Size of company

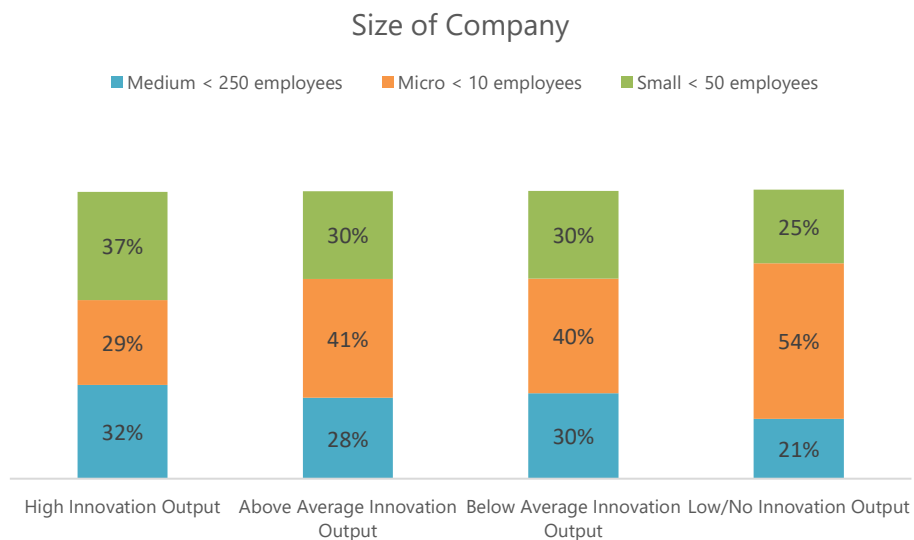


Figure 2 Size of company

As can be seen in the graph above, organisations with a high innovation output are more likely to be an organisation with 10-50 employees. Organisations with the lowest level of innovation output are more likely to have less than 10 employees.

## Gender of CEO

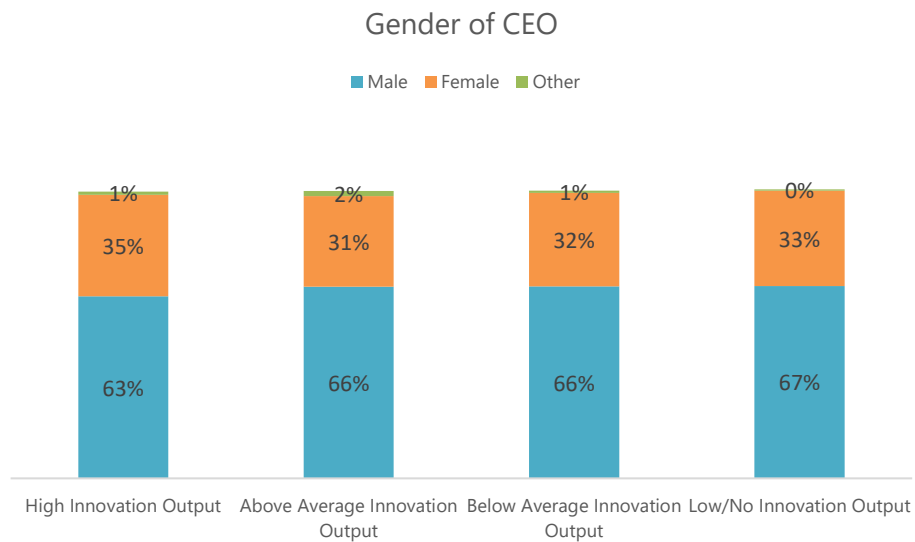


Figure 3 Gender of CEO

Organisations that fall into the high innovation output segment are the most likely to employ a female CEO, whereas, organisations that fall into the lowest innovation output segment are the most likely to employ a male CEO.

## Business Lifecycle

Organisations that are in the highest innovation output segment are more likely to be a start-up or growing. Organisations in the above average innovation output are more likely to be maturing. Organisations with a below average innovation output are more likely to be in the growing stage of their lifecycle and organisations with a low/no innovation output are more likely to be maturing or expanding.

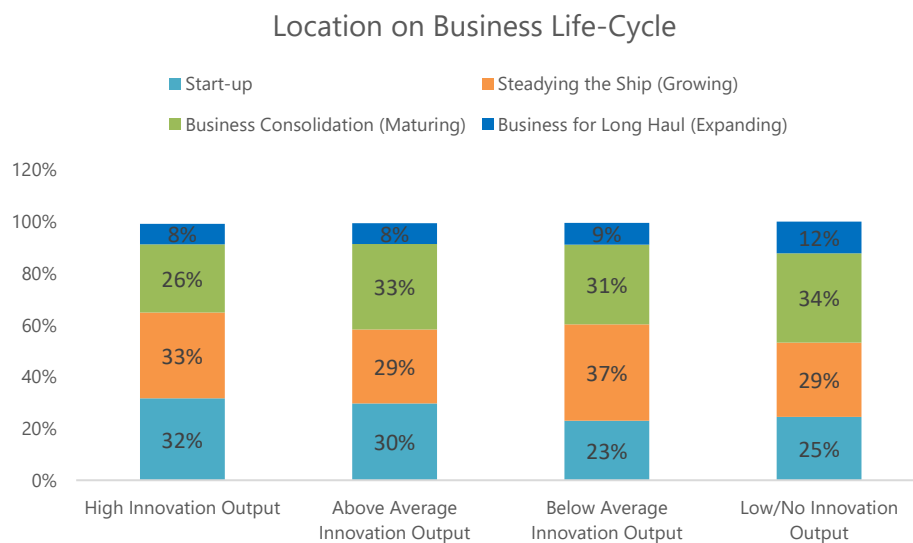


Figure 4 Location on business lifecycle



## Highest education levels of employees

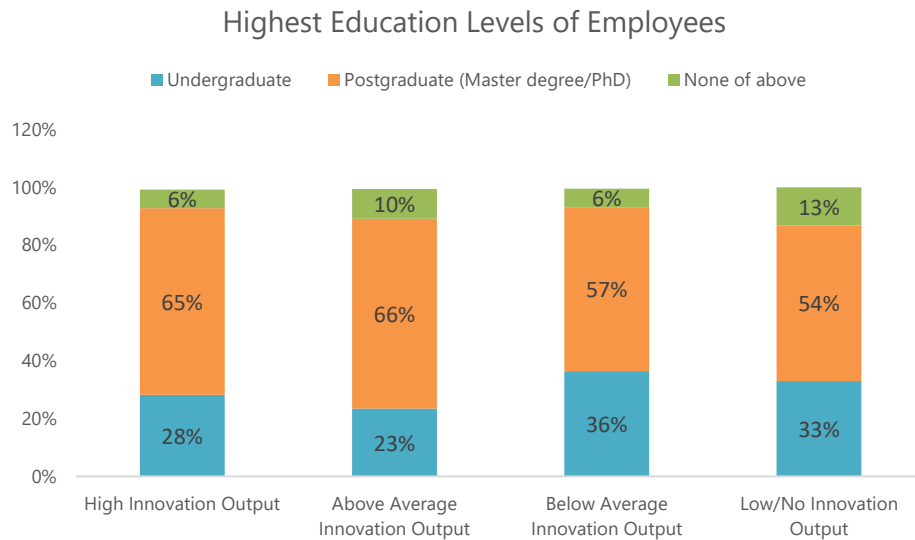


Figure 5 Highest education levels of employees

As can be seen in the graph above, the majority of organisations will have employees who are educated to a postgraduate level. However, the most innovative segments are more likely to employ postgraduates.

## Investment in R&D during the years 2015-17

During the years 2015-17, organisations who fall into the segment with the highest innovation output were the most likely to invest into R&D during this period. Unsurprisingly, organisations on the other end of the spectrum were the least likely to have invested into R&D during this period.

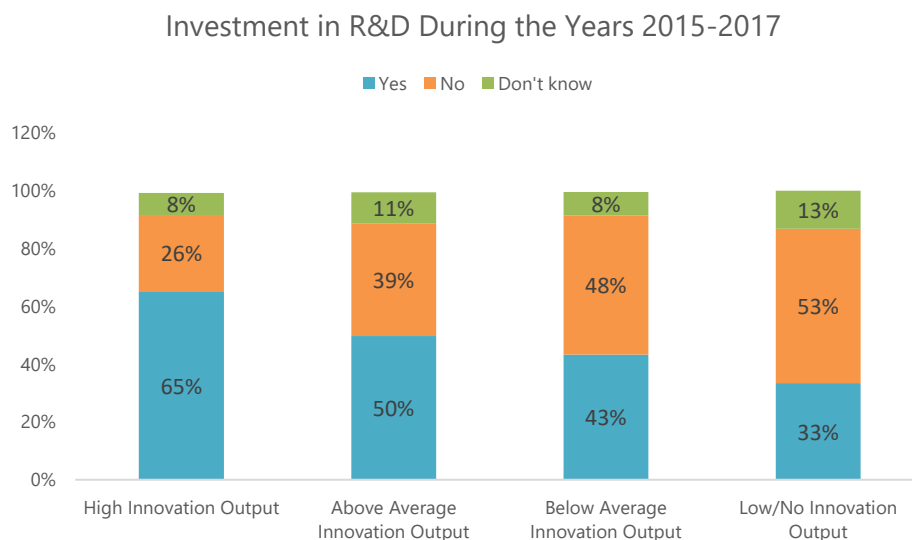


Figure 6 Investment in R&D during the years 2015-17.

### Ongoing R&D activity and investment

Level of innovation is directly correlated with the level of R&D activities. Organisations with the highest levels of innovation output are the most likely to continue to invest in R&D. Conversely, SMEs with low level of innovative output have little or no ongoing R&D activities.

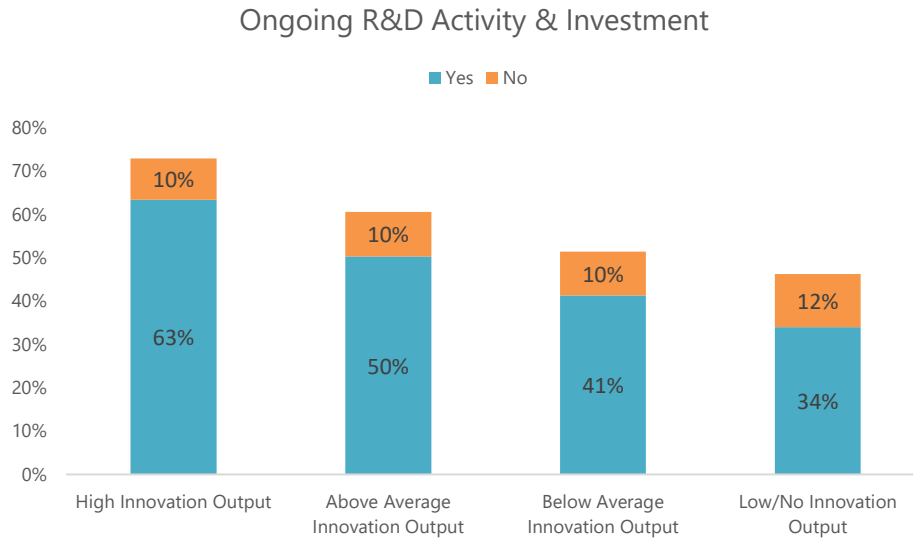


Figure 7 Ongoing R&D activity & investment

### Awareness of government R&D funding opportunities

Again, organisations in the highest innovation output segment are the most aware of R&D funding opportunities provided by the government and organisations with the lowest innovation output are the least aware.

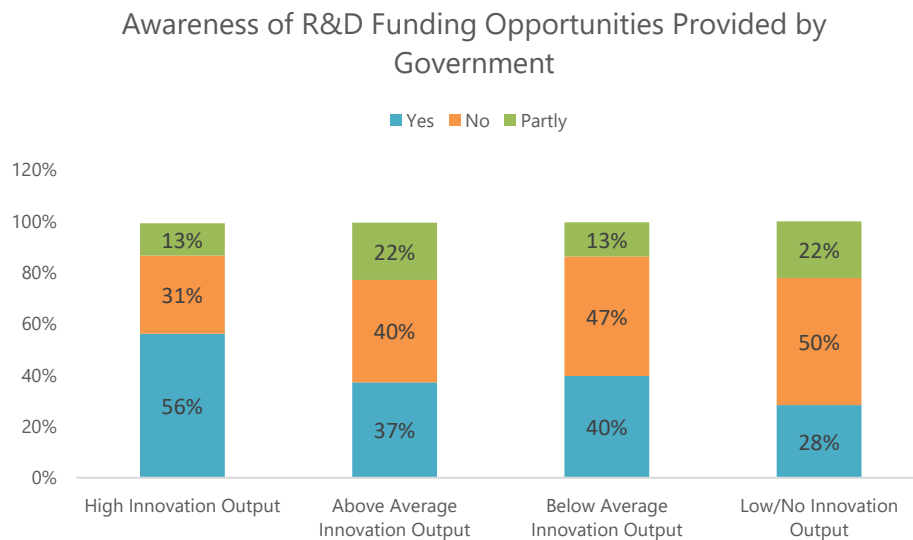


Figure 8 Awareness of R&D funding opportunities provided by government.

## Awareness of existence

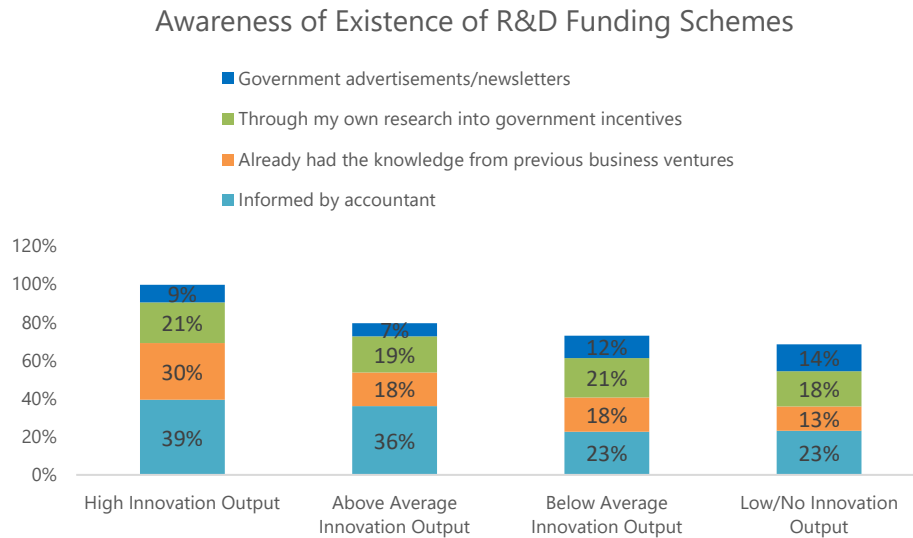


Figure 9 Awareness of existence of R&D funding schemes.

As can be seen above, businesses across all segments are mostly made aware of the existence of R&D funding schemes through their accountants. This shows the importance of the accountant in making businesses aware that funding schemes are available to them.

## Satisfaction with government support

Organisations who fall into the highest output segments are the most likely to be satisfied with the government schemes. However, organisations with a below average innovation output are the least likely to be feeling dissatisfied with the government support.

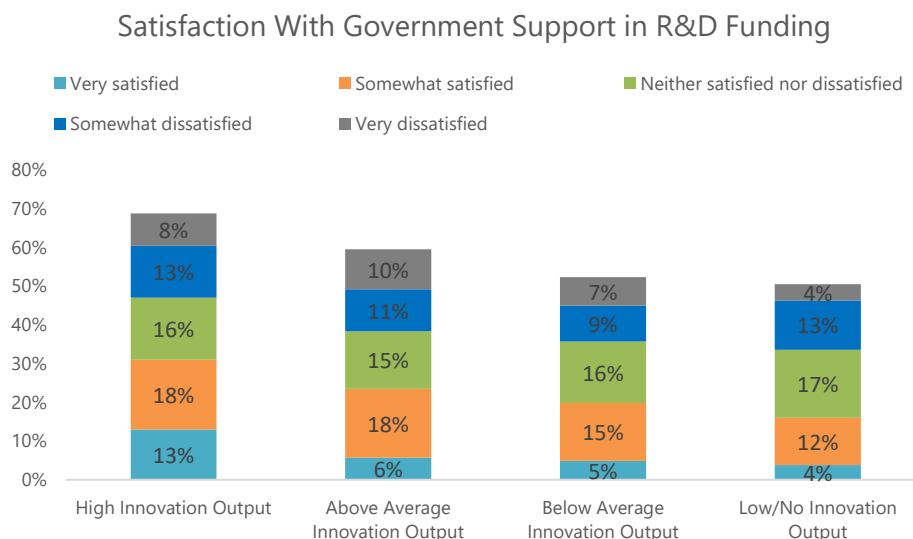


Figure 10 Satisfaction with government support in R&D funding

## Received R&D tax relief/incentives

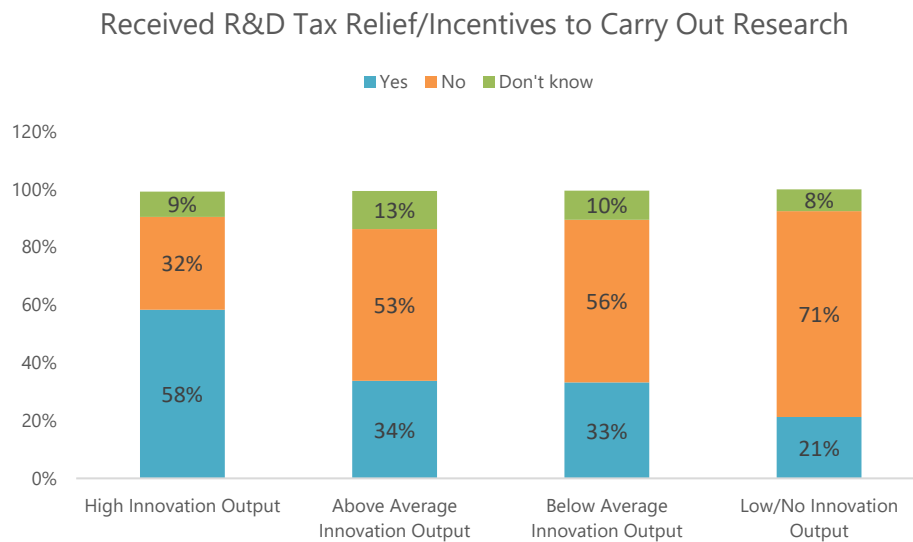


Figure 11 Received R&D tax relief/incentives to carry out research.

Organisations who fall into the high innovation output segment are nearly three times as likely to have received R&D tax relief incentives than organisations with the lowest level of innovation output.

In terms of the relief/incentives received, organisations in the highest innovation output segment are the most likely to have received; deductions in asset used for R&D, tax credits, special exemptions of wage and/or social taxes, corporation tax savings from carrying forward/backward losses, and patent box.

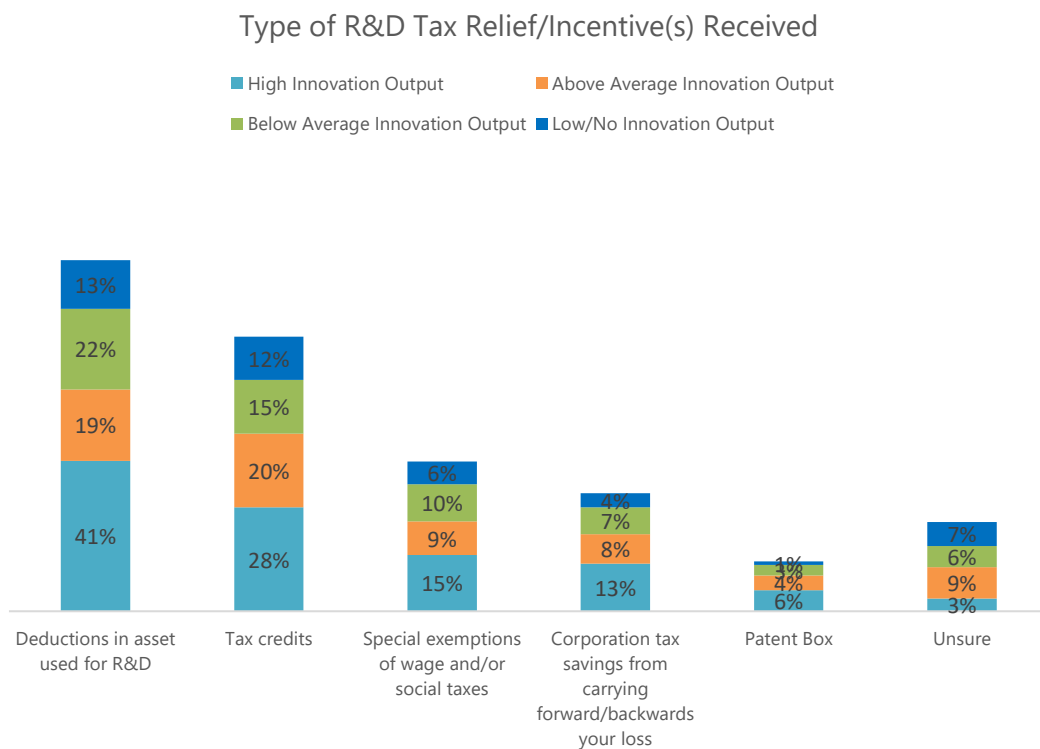


Figure 12 Type of R&D tax relief/incentive(s) received.

Organisations with the lowest level of innovation output were the least likely to have carried out the research had the tax relief/incentives not been received.

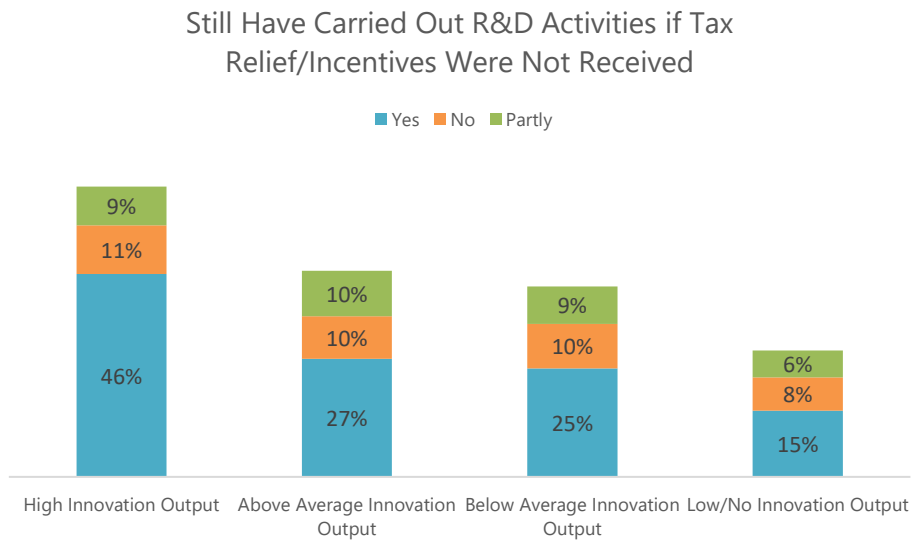


Figure 13 Still have carried out R&D activities if tax relief/incentives were not received.

In terms of the reasons for not utilising R&D tax incentives, organisations who fall into the lowest innovation output segment were more likely than the other segments to be held back by a complicated process, the cost of R&D consultants and their knowledge of incentives as a whole.

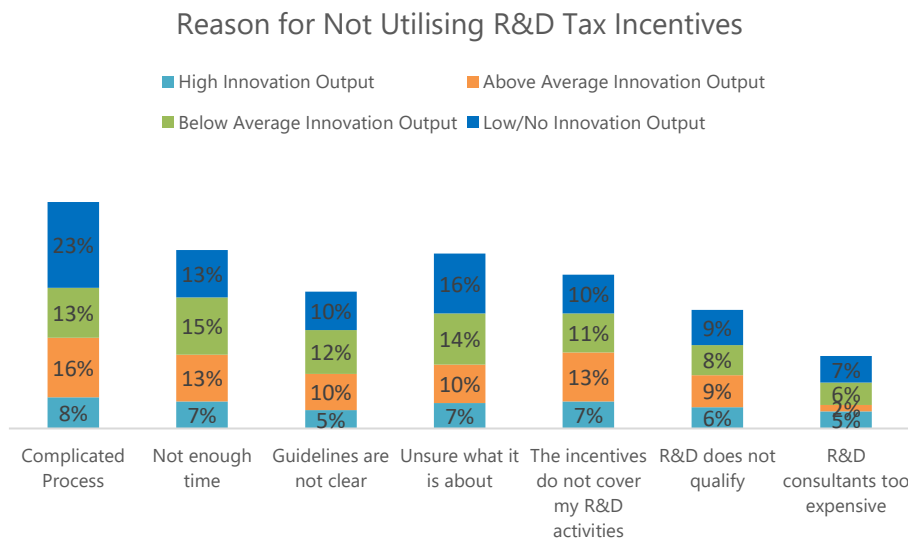


Figure 14 Reason for not utilising R&D tax incentives.

### Other public support

In terms of other non-tax-related, public financial support, organisations who fall into the highest innovation output segment are the most likely to receive Horizon 2020 funding, government loans and subsidies such as grants provided by local or European authorities.

## Other Non-tax-related, Public Financial Support Received

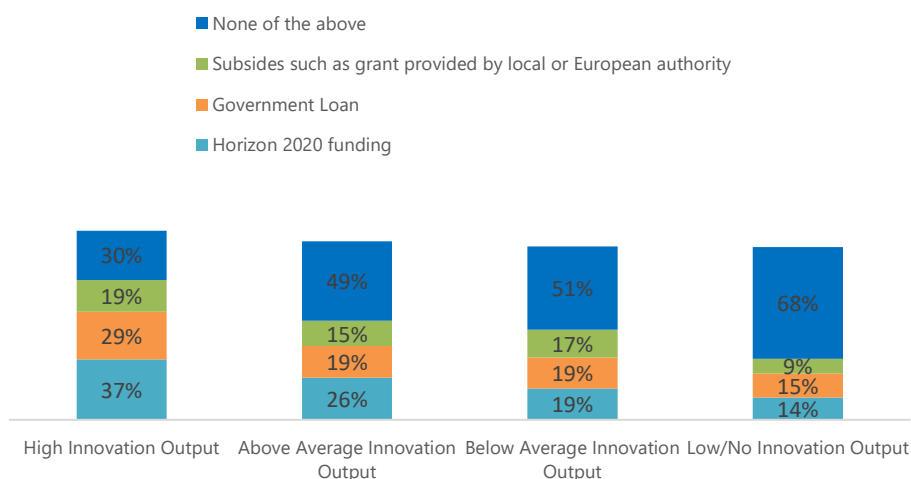


Figure 15 Other non-tax-related, public financial support received.

## Private financial support

As expected, organisations who fall into the segment with the highest innovation output are more likely than the other segments to utilise private support. This segment is the biggest utiliser of venture capital, angel investors and business incubators.

## Private Financial Support Received

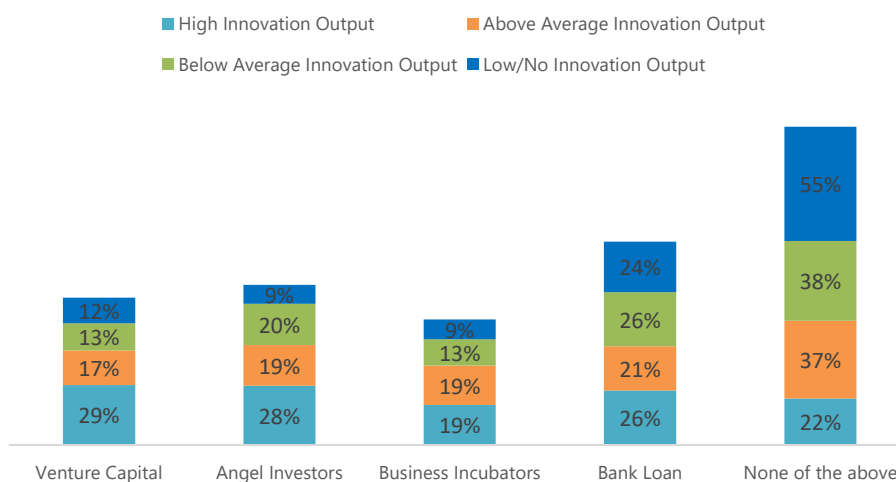


Figure 16 Private financial support received.

## Company introductions

Of the segments, organisations with the highest level of innovation output were the most likely to have introduced a new standalone product or service during the time period. Surprisingly though, an organisation in the lowest output segment was more likely than the other segments to have introduced a new complementary product or service than improves experience of other products or services, introduced a new version of an existing product or service, and introduced a new method of manufacturing or producing goods or services.

## Company Introductions During the Years 2015-2017

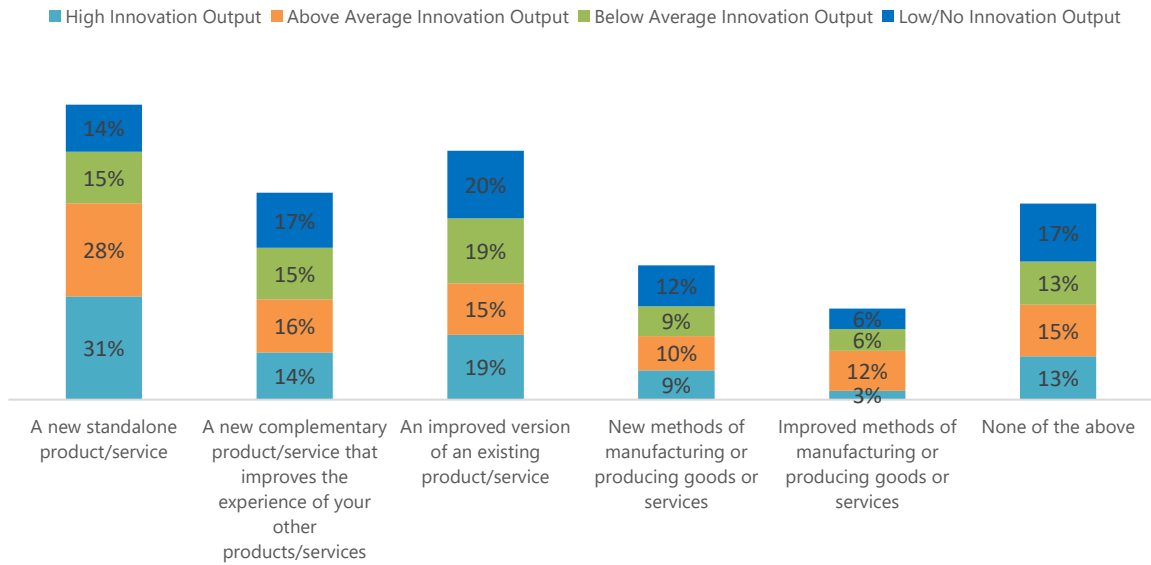


Figure 17 Company introductions during the years 2015-17.

In terms of how these were developed, a company with a high innovation output is most likely to have developed it in-house, outsourced the development or developed it in collaboration with another company or a higher education/government institution.

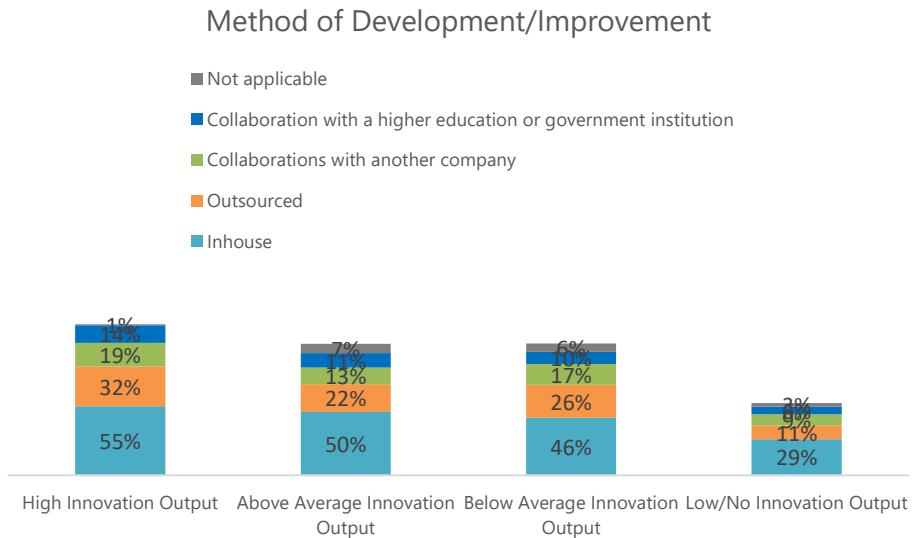


Figure 18 Method of development/improvement

Organisations with a below average innovation output would be the most likely to have not commercialised the innovation, they also are the most likely to have only partly commercialised the innovation also.

## Commercialisation of Innovation

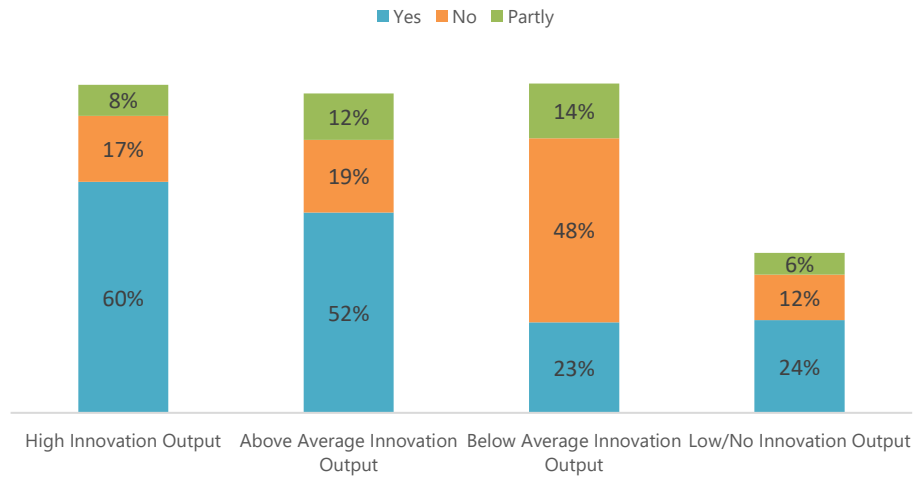


Figure 19 Commercialisation of innovation

Organisations who fall into the highest output segment were the most likely to have profited from the commercialisation of their innovation. Unsurprisingly, organisations who fall into the segment at the other end of the spectrum were the least likely to have made profit from the commercialisation of the innovation.

## Profit from Commercialisation of Innovation

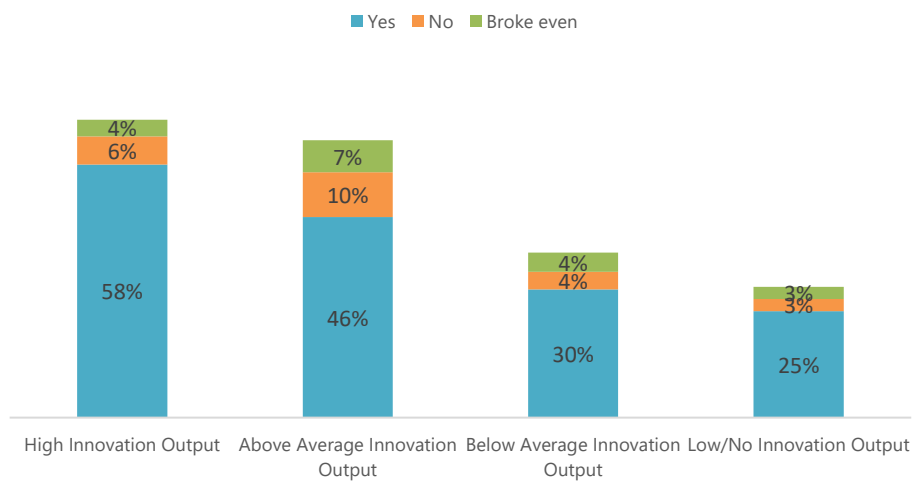


Figure 20 Profit from commercialisation of innovation



## Inventor certificates & patents

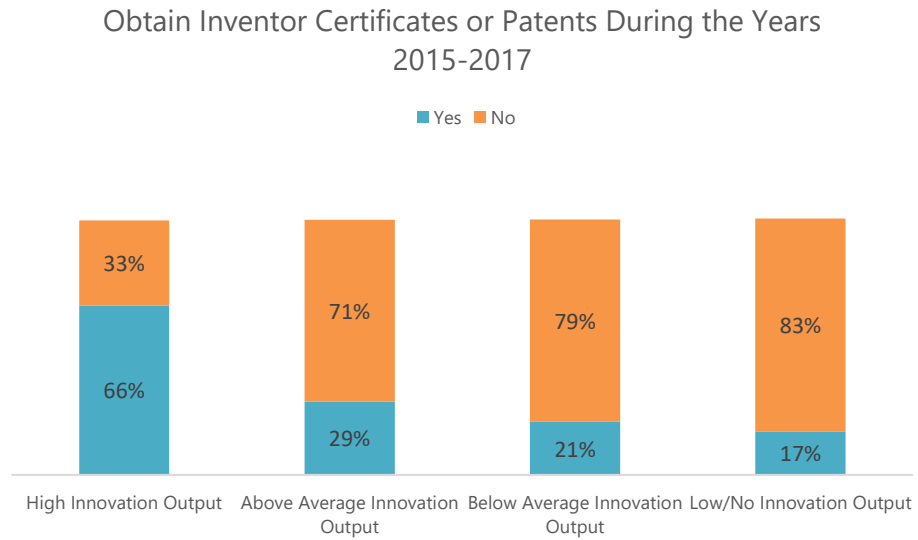


Figure 21 Obtained inventor certificates or patents during the years 2015-17.

In terms of commercialisation, organisations who fall into the segment with the highest output of innovations were the most likely to have commercialised the patents or inventions.

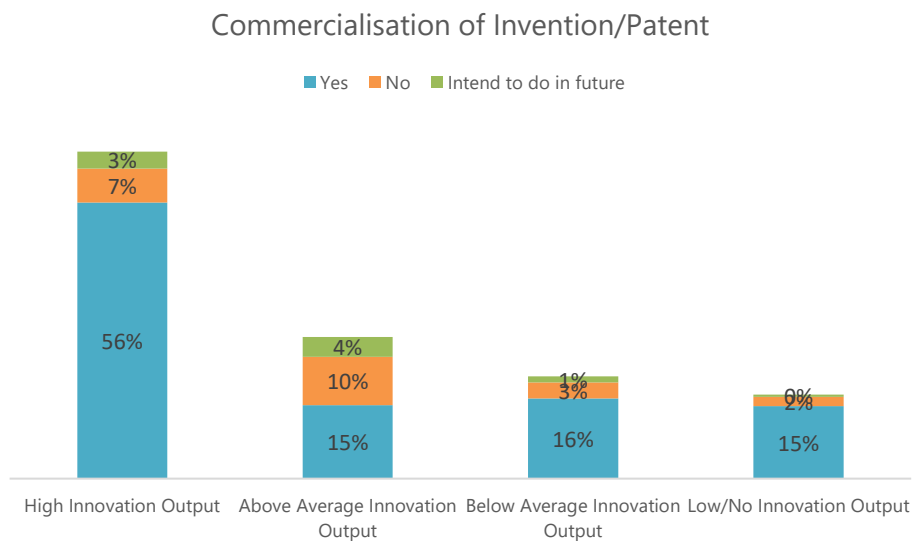


Figure 22 Commercialisation of invention/patent

Again, organisations with the highest level of innovation output were the most likely to have sold and profited from the patent.

### Sell, or Attempting to Sell the Patent

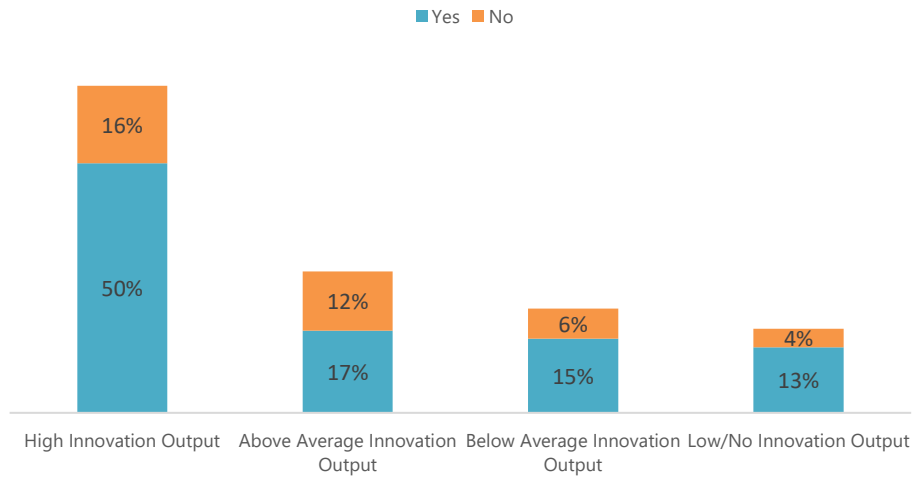


Figure 23 Sell, or attempting to sell the patent

### Company Profit From the Development of the Invention/Patent

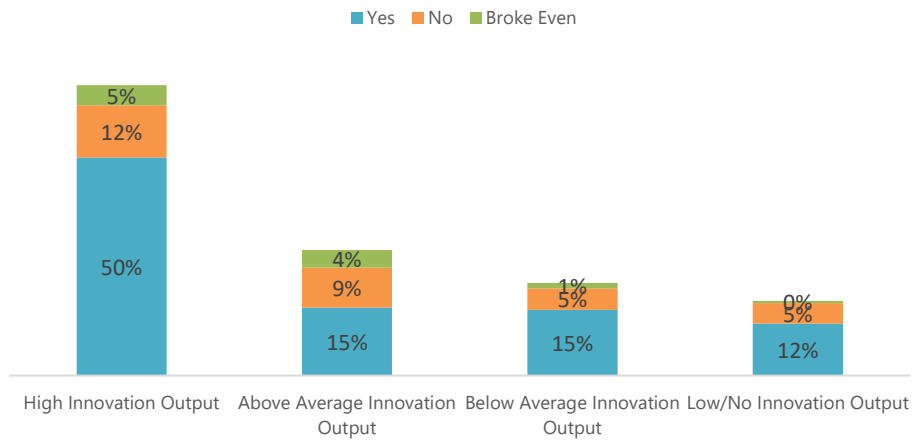


Figure 24 Company profit from the development of the invention/patent

### New business models

## Introduction of a New Business Model in the Last 3 Years and Impact on the Commercial Growth

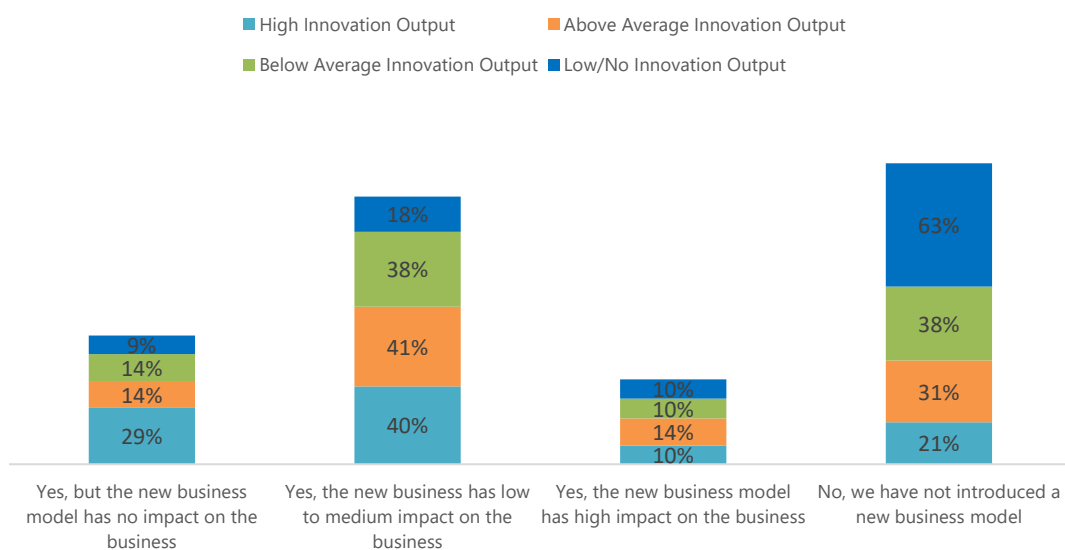


Figure 25 Introduction of a new business model in the last three years and impact on commercial growth.

An organisation who falls into the high innovation output segment is more likely to have introduced a business model that has had no impact on business. An organisation with an above average innovation output, however, has had slightly more success with business models. They are the most likely to have introduced a new business model that has had an impact on the business.

### Key enabling technologies

Organisations who fall into the high innovation output segment are more likely than the other segments to utilise cloud computing, social networks, AI/machine learning, RFID, Advanced manufacturing and Advanced materials to develop their innovations. IoT is being utilised the most by the above average innovation segment.

## Utilisation of Key Enabling Technologies

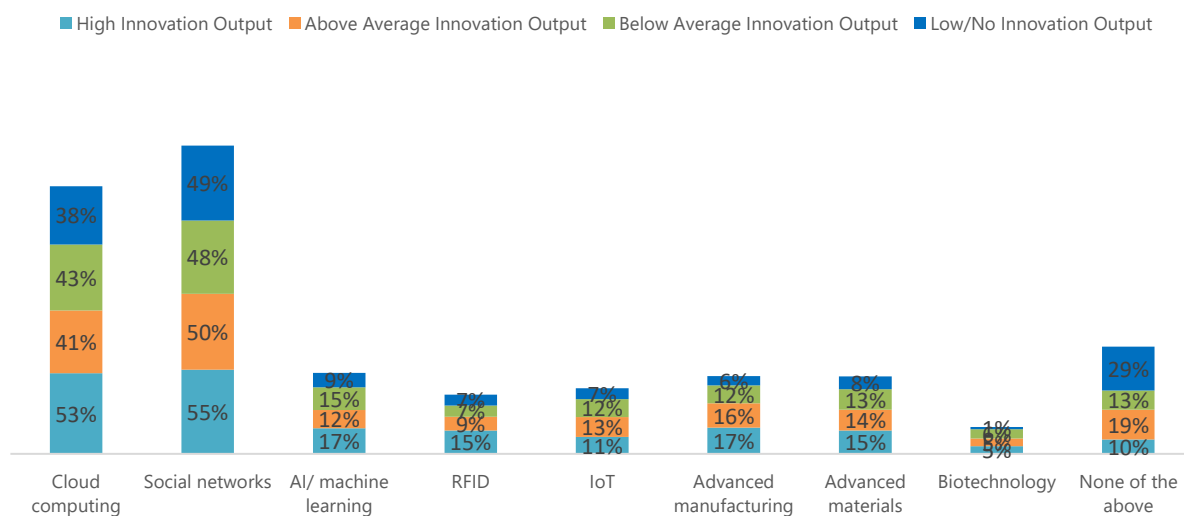


Figure 26 Utilisation of key enabling technologies.

## Key resources

### Location of Key Resources

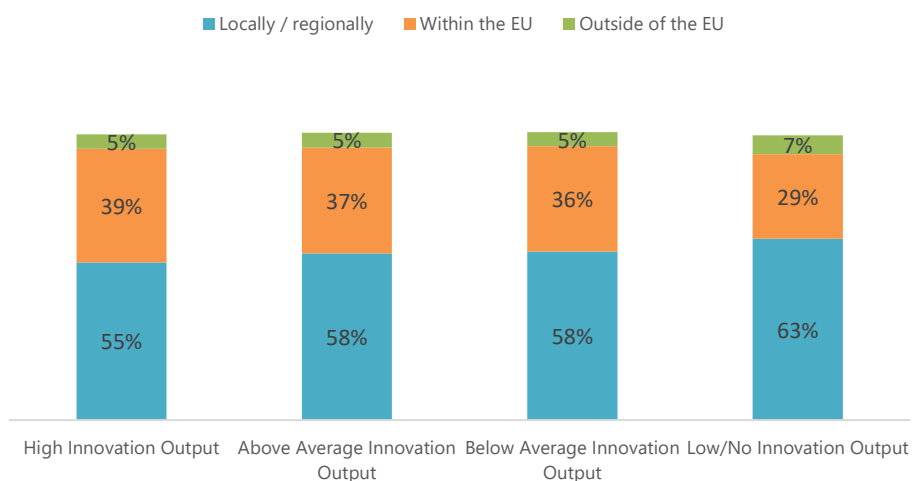


Figure 27 Location of key resources.

Organisations with the lowest level of innovation output are the most likely to stay local to source their key resources. Whereas organisations with the highest levels of innovation output are more open to sourcing their key resources within the EU.

## 7 Segment profiles

In addition to the analysis above, a more detailed analysis of each segment has been conducted. To do this, it was important to focus on the differences between the segments and what made each segment unique.

### 7.1 High Innovation Output Segment - ‘The Groundbreakers’

An organisation that falls into the high innovation output segment is more likely to be a small organisation and is the least likely to be a micro-organisation with less than 10 employees.

These organisations also seem to be more progressive than other segments, as they are the most likely to have a female CEO at their company.

An organisation that falls into the high innovation segment is more likely to be found in the start-up segment of the business lifecycle than any of the other SME segments. These organisations are the biggest investors in R&D and are nearly twice as more likely to have invested into R&D between 2015-2017. It is also more common for this activity and investment into R&D to be ongoing than it is in any other segment.

An organisation that can be found in the highly innovation segment is, as a whole are far more aware of R&D funding opportunities provided by the government. In terms of how this awareness came about, an organisation in this segment is more likely to have been made aware through their accountant or because they had prior knowledge due to previous business ventures. Between 2015-2017, organisations in this segment received approximately €1.1 million in average in R&D tax relief/incentives from Central government and/or Regional authorities.

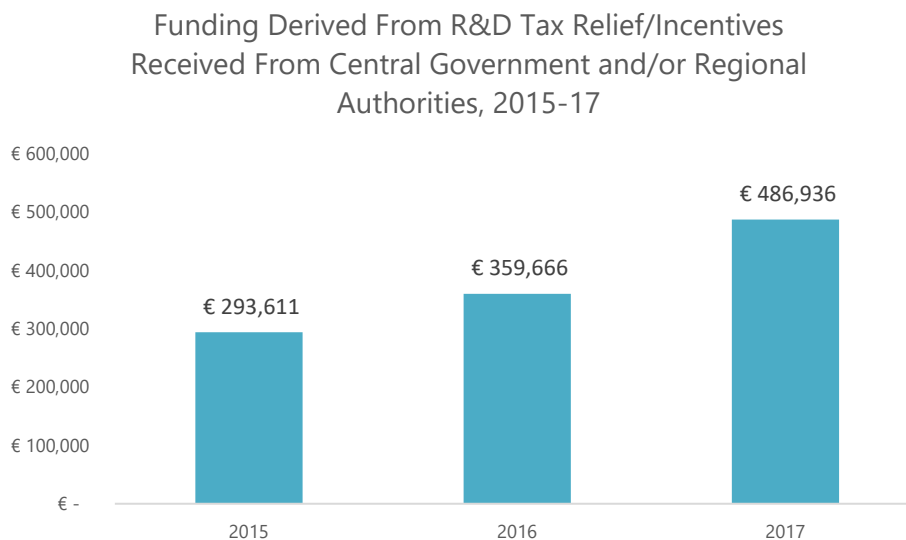


Figure 28 Funding derived from R&D tax relief/incentives from Central government and/or Regional authorities.

Interestingly, this segment has mixed emotions when it comes to government support in R&D funding. Of all the segments, this segment is the most likely to be very satisfied, somewhat satisfied, and somewhat dissatisfied with the support being provided currently.

Unsurprisingly, an organisation that falls into the high innovation output segment is the most likely to have received R&D tax relief/incentives to carry out their research. During the years 2015-17, they have also spent an approximate €1.2 million on R&D on average.

Industries in which this segment are more likely to operate in than the other segments are as follows:

- the extraction of crude petroleum and natural gas, the mining of metal ores
- the manufacture of wearing apparel,
- the printing and reproduction of recorded media,
- the manufacture of chemicals and chemical products,
- the manufacture of electrical equipment,
- water collection, treatment and supply, water transport,
- accommodation,
- programming and broadcasting activities,
- security and investigation activities,
- public administration and defence

In terms of the types of R&D relief/incentives received, an organisation that falls into this segment is more likely to have received relief via the broad spectrum of incentives available than any organisations that fall into the other segments including deductions in assets used for R&D, tax credits, special exemptions of wage and/or social taxes, corporation tax savings from carrying forward/backwards losses, and patent box. This demonstrates their greatest awareness of the R&D incentives available.

However, although this segment is dominant in the relief received field, they are also the most likely segment to still have carried out the R&D activities even if the relief/incentive(s) were not received.

In terms of public financial support, organisations that fall into this segment are more likely than any other segment to have received support via Horizon 2020, government loans, and subsidies such as grants provided by a local or European authority.

When private support is concerned, organisations with a high innovation output have received approximately €1 million from private sources since 2015 and are more likely to have received support via venture capitalists and angel investors than any other segment.

During the years 2015-17, an organisation that falls into this segment is the most likely to have introduced a new standalone product or service. In terms of the methods in which company introductions are developed/improved, organisations in this segment are the most likely to develop in-house, to outsource, to develop in collaboration with another company and in collaboration with a higher education or government institution.

Again, unsurprisingly, organisations in this segment are more likely to have commercialised and profited from the innovations which they have developed.

In terms of IP, organisations with a high innovation output are more than 2 times as likely to have obtained inventor certificates or patents in 2015-17 than any of the other segments. They are also the most likely to have commercialised, sold and profited/broke-even from the development of these patents.

Organisations that fall into the high innovation output segment are more likely than any other segment to have introduced a new business model which has had no impact on the business. This is probably an indication of the risk taken with innovation, which do not always translate

into the expected impact. Alternatively, the impact may be attributed to the product or service innovation rather than the business model.

In terms of key enabling technologies, this segment is the biggest utiliser of Cloud computing, Social networks, AI machine learning, RFID, Advanced manufacturing and Advanced materials. The key resources utilised by organisations in this segment are more likely to be from within the EU than any other segment.

## 7.2 Above Average Innovation Output Segment - ‘The Conservatives’

An organisation that falls into the above average innovation segment is more likely to have employees educated to a postgraduate level than any other segment. However, they are the least likely of all the segments to employ a CEO who is female. During the years 2015-17, they have also spent an approximate €830,000 on R&D on average.

Industries in which this segment are more likely to operate in than the other segments are as follows:

- manufacture of paper and paper products,
- mining and quarrying
- manufacture of other non-metallic mineral products
- air transport
- publishing
- human health activities
- social work activities.

Between 2015-2017, organisations in this segment received approximately €290,000 in R&D tax relief/incentives from Central government and/or Regional authorities.

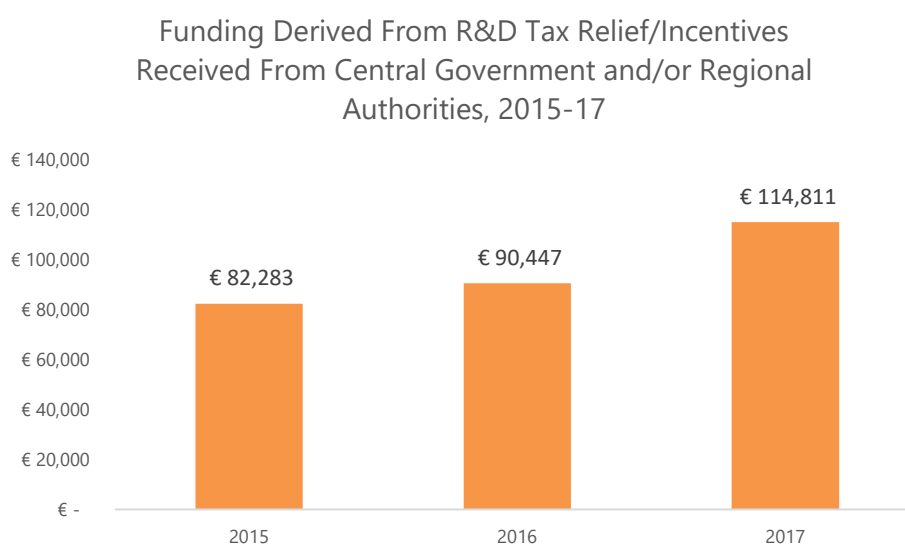


Figure 29 Funding derived from R&D tax relief/incentives from Central government and/or Regional authorities.

In terms of satisfaction with current government support, organisations in this segment are the most likely to be feeling very dissatisfied with the aid that they have received from the government. There also appears to be a lack of awareness surrounding relief/incentives, as organisations in this segment seem to have the highest scepticism regarding whether they have received R&D relief/incentives.

One of the reasons for this low level of utilisation of government support by this segment could be partly down to the fact that these organisations are the most likely to held back because the R&D incentives would not cover their R&D activities. However, they are the segment least affected by the cost of R&D consultants.

As far as private financial support is concerned, an organisation that falls into the above average innovation output segment have received approximately €569,000 on average from private sources since 2015.

An organisation that falls into this segment is the most likely to have introduced and improved method(s) of manufacturing or producing goods or services during 2015-17.

Organisations that fall into this segment are the least likely to commercialise any inventions or patents acquired during 2015-17. In terms of business models, organisations who have an above average innovation output are the most likely to have either introduced a business model that has had a low to medium impact on their business or introduced a business model that has had a high impact on their business.

In terms of enabling technologies. Organisations in this segment are the most likely to utilise the Internet of Things (IoT) to aid in the commercial growth of their organisation.

19% that don't use enabling technologies.

### **7.3 Below Average Innovation Output Segment - 'The Casuals'**

An organisation that falls into this segment is more likely to be located in the growing sector of the business lifecycle than any other segment, however, they are organisations least likely to be in the start-up stage. They are also the most likely to employ staff educated to an undergraduate level. During the years 2015-17, they have also spent an approximate €670,000 on R&D on average.

Industries in which this segment are more likely to operate in than the other segments are as follows:

- the manufacture of coke and refined petroleum products
- waste collection, treatment and disposal
- construction
- food and beverage science
- computer programming
- legal and accounting services.

Between 2015-2017, organisations in this segment received approximately €141,000 in R&D tax relief/incentives from Central government and/or Regional authorities. They have also received approximately €267,000 from private sources since 2015.



Funding Derived From R&D Tax Relief/Incentives  
Received From Central Government and/or Regional  
Authorities, 2015-17

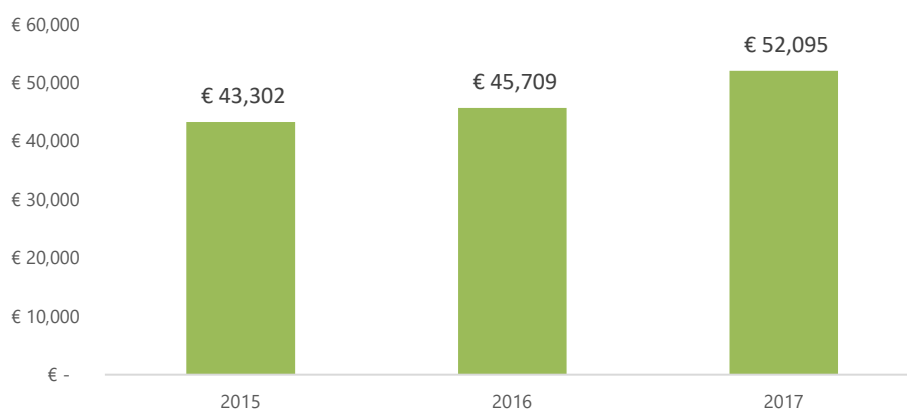


Figure 30 Funding derived from R&D tax relief/incentives from Central government and/or Regional authorities.

Interestingly, organisations who fall into this segment are the least likely to feel dissatisfied by Government support in R&D funding.

In terms of issues holding back the utilisation of R&D tax incentives, an organisation that falls into the below average innovation output segment is more likely to be held back by time constraints than any other segment.

Organisations that fall into this segment are the most likely to only partly commercialise any innovations. However, they are also the most likely to not commercialise the innovations at all.

In terms of key enabling technologies, organisations who fall into this segment utilise Biotechnology more than any of the other segments. They are also the segment who utilise social networks the least.

#### 7.4 Low/No Innovation Output Segment - ‘The Traditionals’

An organisation that falls into the segment of having a low/no innovation output is more likely to be a micro company with 10 employees or less. They are also more likely to have a male CEO than any of the other segments.

Industries in which this segment are more likely to operate in than the other segments are as follows:

- forestry and logging
- manufacture of wood and cork products
- manufacture of basic pharmaceutical products and pharmaceutical preparations
- manufacture of fabricated metal products
- retail trading
- financial services
- head office activities
- rental and leasing
- creative arts
- repair of computers

- personal and household goods

During the years 2015-17, they have also spent an approximate €322,000 on R&D on average.

Organisations in this segment are the most likely to be located in the growing or maturing sector of the business lifecycle.

In terms of R&D investments, companies with a low/no innovation output are the most likely to have not invested into R&D during 2015-17. They are also the most likely to be unsure if they have invested in R&D which shows a potential lack of understanding of what innovation is. Any investment made however, is most likely not ongoing.

As would be expected, organisations that fall into this segment are the most likely to be unaware of R&D funding opportunities currently being provided by the government. Those organisations who are aware of these opportunities, however, are more likely to have been made aware of them via government advertisements or newsletters than any of the other three segments.

Between 2015-2017, organisations in this segment received approximately €92,000 in R&D tax relief/incentives from Central government and/or Regional authorities.

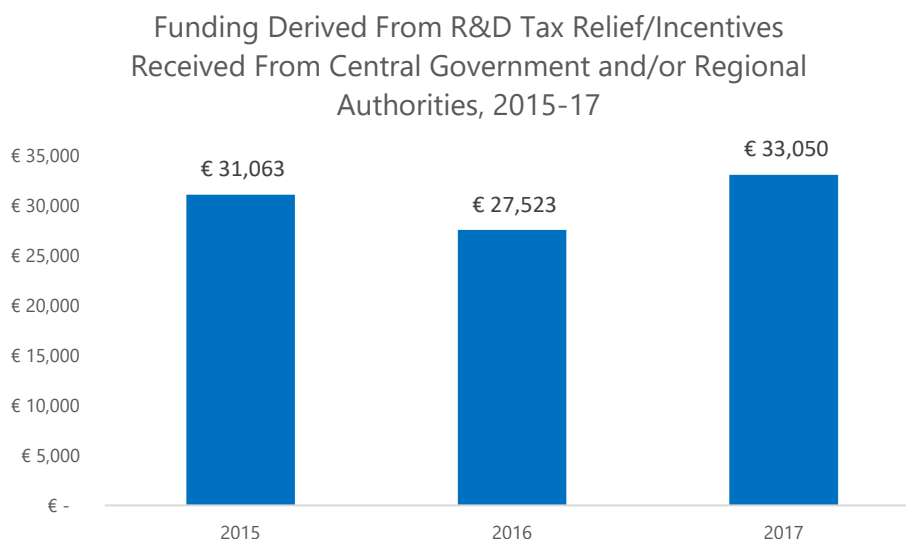


Figure 31 Funding derived from R&D tax relief/incentives from Central government and/or Regional authorities.

They have also received approximately €148,000 from private financial sources since 2015.

In terms of satisfaction with these government schemes, this segment is actually the most impartial. They are the most likely to be feeling neither satisfied nor dissatisfied with the government support.

Again, unsurprisingly, organisations in this segment are the least likely to have received any R&D tax relief/incentives to carry out research. They are the least likely to have received all of the options given to the respondents of the survey.

These organisations are being held back by many issues preventing them from utilising R&D tax relief incentives. They are the most likely to be held back by: the complicated proves of acquiring the incentives, the fact that they are actually somewhat unsure of what R&D tax incentives actually are, because their R&D does not qualify for the incentives, or because of the expensive cost of R&D consultants.

Organisations who fall into this segment are also the least likely to utilise any other public financial support. They are also the least likely to utilise any private financial support.

They were the most likely to have introduced either a new complimentary product/service that improves the experience of their other products/services, an improved version of an existing product/service, or a new method of manufacturing/producing goods or services.

Organisations with low/no innovation output are the least likely to have obtained any inventor certificates or patents in 2015-17. Those who did obtain inventor certificates or patents, however, were less likely to have profited from them.

In terms of business models, organisations in this segment were the least likely to introduce a new business model in 2015-17. This suggests a reluctance to adapt a business model to fit the current economic and social climate.

Organisations in this segment were the most likely of the segments to stick to sourcing key resources locally or regionally.

## 8 Discussion and conclusions

Through a simple methodology, SMEs have been segmented into four distinct groups based on their level of innovation and commercialisation.

The ‘groundbreakers’ are the most innovative SMEs. They consistently invest in R&D and are well aware of the broad range of R&D funding opportunities. They produce strong, patentable IP that they successfully commercialise. They are the most progressive segment, having the most female CEOs and being the biggest users of key enabling technologies. They are growing companies and start-ups.

The ‘conservatives’ are mostly micro or small companies. They are more mature companies and take more calculated risks. As such, their innovation is not as strong, limiting their opportunities for patenting but also to access funding. However, they are the most successful at introducing new business models. They are also the most likely to be very dissatisfied with the aid available from the government for R&D. This is probably linked to the fact that there is a mismatch between their R&D activities and the eligible activities for R&D incentives.

The ‘casuals’ are growing and maturing companies. Although they undertake innovation, they don’t necessarily commercialise it. They are the least likely to be dissatisfied with government support for R&D but most of them did not receive any public financial support. They mostly use banks loans as a finance option. They are unsure of what are R&D incentives, find them complicated and time consuming.

The ‘traditionalists’ are mostly micro companies with a male CEO. They are the lowest investors in R&D. They tend to be ad-hoc innovators. Their innovation is most likely to be an improved version of an existing product or service with low IP. They may lack understanding of what innovation is and few innovate with business models. They don’t generally use either public or private R&D finance.

The greatest value would be obtained by supporting the groundbreakers as they are the biggest investors in R&D and the ones to profit the most from their innovation. However, exploring further the conservative segment may lead to untapped opportunities. The impact may not be as high but if they can be supported appropriately, conservative SMEs could generate worthwhile impact. There is clearly a mismatch between the expectation of these SMEs and the support available to them. There are two possible challenges with this segment. Their innovation consists of lower level innovation not always patentable, which means that it can be more easily copied. Similarly, with new business models, although these can create a competitive advantage, it is not protectable through patents and there is a greater risk that it can be copied.

The conservatives are the neglected SMEs because their innovation is not sufficiently strong to be patentable and ground-breaking. The level of support into this SMEs would not be expected to be as intensive as for the groundbreakers. Further research would be needed to understand the right level of investment needed for these organisations to help them maximise the return, particularly looking into how business model innovation could be better supported.

The ‘casuals’ and the traditionalists’ are the lower innovation segments. They are the ‘long tail’ of innovative SMEs. Targeting these segments is unlikely to lead to high returns. However, they may benefit from lower intensity incentives designed for them. For example, they may benefit from education into innovation and innovation does not necessarily translate into new products or services but could be a new business model.

We have proposed a simple methodology relying on indicators that SMEs can easily share, although it is still relying on asking SMEs for the information. Business support and incentives providers could have a quick registration form or widget that would easily segment SMEs. They could then adjust the support and incentive to be provided based on the segment the SME would belong to.

Nevertheless, the segmentation could be taken further if SMEs could be profiled based on the R&D incentives to profit indicators. However, as previously discussed, the challenge is to collect accurate financial data from SMEs. In the age of Big Data, finding a solution to obtain the necessary data to benchmark SMEs would be extremely valuable. The data is confidential and held by the SMEs themselves. Some organisations such as the European Commission, HMRC and other similar organisations may hold at least part of the data. Identifying a way that official organisations or SMEs could share this data in a non-confidential manner would be an important step forward in the creation of accurate benchmarks and segmentation at country and EU levels, without having the need to rely on surveys.

## 9 References

McKinsey, Quarterly - Taking the measure of innovation, April 2018 article by Guttorm Aase, Erik Roth and Sri Swaminathan

<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/taking-the-measure-of-innovation>

Organisation for Economic Co-operation and Development, Centre for Entrepreneurship, SMEs, Regions and Cities (CFE); Leveraging Business Development Services for SME productivity Growth International Experience and Implications for United Kingdom Policy, Final Report November 2018

[http://www.oecd.org/industry/smes/Final%20Draft%20Report\\_V11.pdf](http://www.oecd.org/industry/smes/Final%20Draft%20Report_V11.pdf)

Sally Dibb, Lyndon Simkin; Judging the quality of customer segments: Segmentation effectiveness, Journal of Strategic Marketing 18 (2), April 2010