Forfás Innovation Survey

The Fourth Community Innovation Survey - First Findings

September 2006

Forfás

Introduction

This publication presents first results from the latest Innovation Survey of firms operating in Ireland, carried out by Forfás. The survey covers innovation activity in the period 2002-2004. It has been carried out under the agreed set of international rules as laid out in the OECD Oslo Manual (See page 4 for further methodological information).

The innovation survey is part of the EU "Community Innovation" set of surveys, which will now be carried out every two years. More detailed analysis including international benchmarking, will be published by Forfás in the coming months when comparison data becomes available from the EU and Eurostat.

Definitions

Definitions of the terms used are as follows:

Product Innovation – firms which introduced a **new** good or service or a **significantly improved** good or service with respect to its capabilities. The product innovation could **either** be new to the market or new to the firm.

Process Innovation – firms which introduced a **new** or **significantly improved** production process, distribution method, or support activity for goods and services. The process innovation could **either** be new to the market or new to the firm.

New to market innovation – an innovation activity, which saw the introduction of a new good or service by the firm onto its operating market before other competitors.

New to firm innovation – an innovation activity which saw the introduction of a significantly improved good or service to the firm, that was already available from competitors in the operating sector.

Innovation expenditure – spending by firms on activities to support and implement production or process innovations. This may have included innovation spending on:

- Research and development
- Engineering and development work
- Acquisition of machinery and equipment
- Software and licenses
- Purchases of external knowledge and training
- Design and marketing

Innovation activities can be developed by the firms either fully by themselves, in collaboration with others, or fully by third parties.

Summary of Results:

Activity

- Between 2002 and 2004, 52.2% of all firms were classified as innovation active.
- 47.2% of small sized firms (10-50 employees) were innovation active in the three year period surveyed. This activity rate rose to 65.3% for medium-sized firms (50-249 employees) and to 75.1% for large firms.

Sectoral activity

- The industrial sector recorded an innovation activity rate of 60.9% between 2002 and 2004. The chemicals sector was the most innovation active sector in the Irish economy, with 80% of firms carrying out innovation activities.
- 43.8% of service sector firms were involved in product or process innovation. Companies in the computer related service sectors were the most innovation active, followed by companies in the communication and engineering sectors.

Types of Innovation

- 37.9% of firms were "product" innovators. Across the various sectors of the economy, 48.3% of industrial firms carried out a product innovation compared to 27.9% of service firms.
- 42.7% of all firms were involved in process innovation between 2002-2004. Most of these firms were in the industrial sector (49.7%).

Innovation contribution to turnover

- The development of innovative products and processes was a key driver of turnover between 2002 and 2004. 10.1% of turnover was as a direct result of innovation development.
- The contribution to turnover from new to market goods (creativity measure) was 5.6%.

Innovation impacts

- The largest impact of innovation on firms was identified as increasing the product range, followed by entering new markets.

Factors hampering innovation

- The three largest factors hampering innovation active firms, were identified as, lack of funds, high costs of innovation, and lack of skills.
- For non-innovative firms, high costs were the main hampering factor.

Collaboration

- 32.3% of innovation active firms were involved in collaboration activities.

Methodology

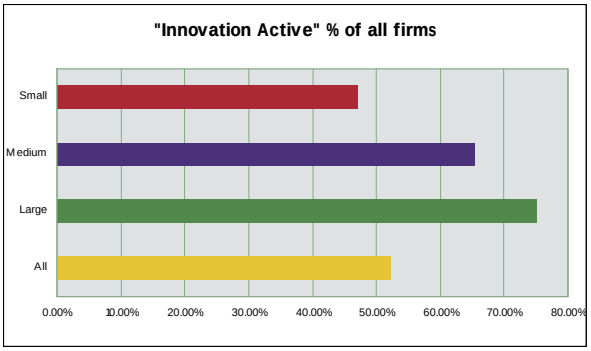
A stratified sample of 2324 firms employing 10 or more employees, and which reflected the current make up of the Irish economy, was drawn up from within an overall sample frame of firms operating in the manufacturing and services sectors of the economy.

The sample was stratified by size of firm, type of activity, and by region. Paper questionnaires were distributed by post to all the firms in the stratified sample, with a further two rounds of questionnaires sent via post to non-respondents. Telephone validation was also conducted with some respondents to check quality of data received. A small non-response analysis was conducted.

Full responses were received from 976 firms in the core sample of 1894 firms, resulting in a response rate of 51.5%, in line with the EU average. Survey results were then grossed up using standard statistical procedures, to accurately reflect the overall make-up of firms across those parts of the Irish economy, covered in the core coverage (Note 4 – page 9).

Innovation Active Firms

Firms which are classed as "innovation active" are those that have carried out a "product" innovation or a "process" innovation between 2002 and 2004, or who have abandoned *or* have on-going innovation activities.



52.2% of Irish firms in the core sample were classified as innovation active between 2002 and 2004. (International data from other EU countries will be published in November of this year, which will facilitate more in-depth benchmarking analysis).

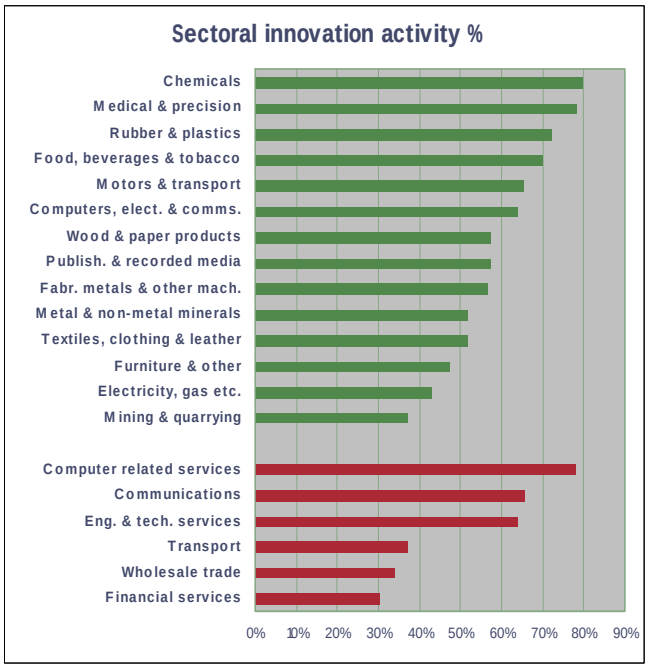
There are wide differences in the rates of innovation activity for differing sizes of firms. As would be expected large firms (250+ employees) are the most innovative active enterprises across the economy, with an activity rate of 75.1%, well ahead of the activity rates for medium and small firms which are 65.3% and 47.2% respectively.

There is also wide variance in the rates of innovation activity across the various sectors of the Irish economy. Rates of innovation activity are higher for firms classed in industrial sectors of the economy (mining and quarrying, manufacturing and utilities) than for service sector firms.

The highest innovative sectors in the industrial sector are chemicals (79.9% active), medical and precision (78.4%), rubber and plastics (72.2%) and food and beverages (70.1%). The lowest rates of innovation activity in the industrial sector are for furniture manufacturing (47.3%), electricity and gas (42.9%) and mining and quarrying (37.1%).

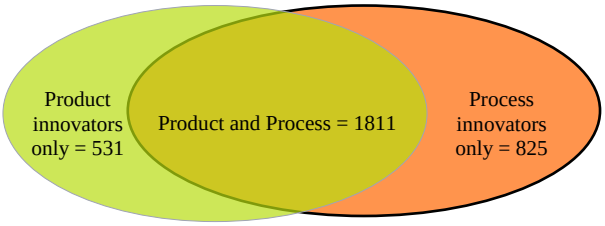
In the services sector the highest rate of innovation activity was recorded in the computer related services sector which had an activity rate of 78.1%. This was followed by firms in the communication sector, and those in the engineering and technical services sector,

which posted innovation activity rates of 65.7% and 64.1% respectively. The weakest rate of innovation activity in the services sector was for those firms in the financial services sector with an activity rate of just 30.5%.



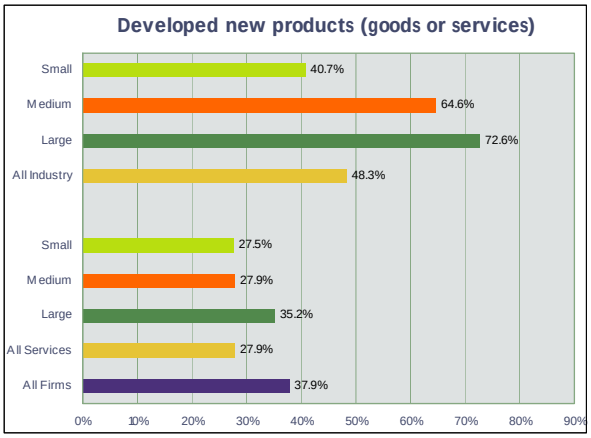
Types of Innovation

Firms across the Irish economy who are innovation active take part in a wide mix of innovation methods. Some are product innovators only, some are process innovators only, some have abandoned or have on-going activities, and the remainder are "dual" type innovators i.e. those carrying out both product and process innovations. Of the 6177 estimated companies in the core sectors of the Irish economy which were part of the analysis, 3222 were classified as innovation active, with 2955 classed as inactive. Of those active, 531 were product innovators only, 825 were process innovators only, and 1811 carried out both types of innovation. 55 had abandoned activities.



Product Innovation

Product innovating firms are those which introduced a **new** good or service or a **significantly improved** good or service with respect to its capabilities. Across the economy 37.9% of firms had a product innovation for a good or service in the 2002-2004 period surveyed.



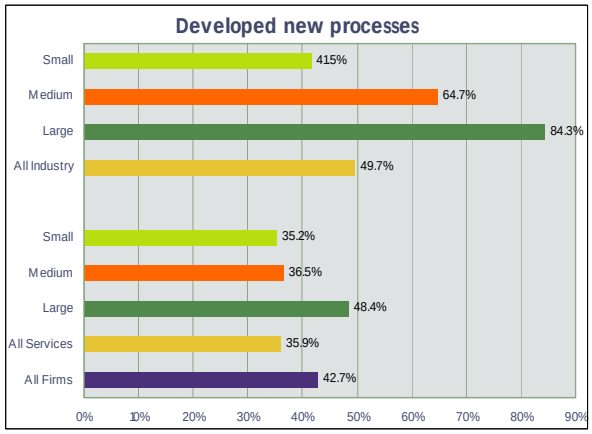
There were wide differences in the rate of product innovation activity with respect to type and size of firm. Although the overall rate of product innovation for all firms is 37.9%, this activity rate rises to 48.3% for firms classified as in the industrial sector. This falls to 27.9% for firms in service sectors of the economy.

Large industrial firms were the largest group of product innovators compared to other sectoral sizes of firms. 72.6% of these firms carried out a product innovation for a good or service between 2002 and 2004. Medium sized industrial firms were only marginally behind this leading activity rate, with 64.6% of those firms introducing a new good or service as a result of a product innovation. Small-sized firms employing 10-50 people in the industrial sector had an innovation rate of 40.7%.

Variances in product innovation activity were much less marked for firms classified in the services sector of the economy. In those sectors, 27.9% of all firms introduced a good or service as a result of a product innovation between 2002 and 2004. Again large service sector firms were the largest group of product innovators at 35.2%. This compared to 27.9% of medium sized service sector firms who introduced a new or significantly improved product with respect to its capabilities. This activity rate was just marginally ahead of small sized firms in the service sector, which stood at 27.5%.

Process Innovation

Process innovating firms are those which implemented a **new** or **significantly** improved production process, distribution method, or support activity for a good or service. Across the economy 42.7% of firms carried out a process innovation between 2002 and 2004, marginally ahead of the product activity rate of 37.9%. Types of process innovation also vary significantly from the total 42.7% rate. A total of 31.6% introduced a new or improved method of manufacturing or producing goods and services. A far lower 19.0% of firms were involved in process innovation which included improved logistics, delivery or distribution methods for inputs. Finally, 21.1% of enterprises carried out an improved supporting activity such as: improved or new maintenance systems; purchasing methods; accounts or information technology support.



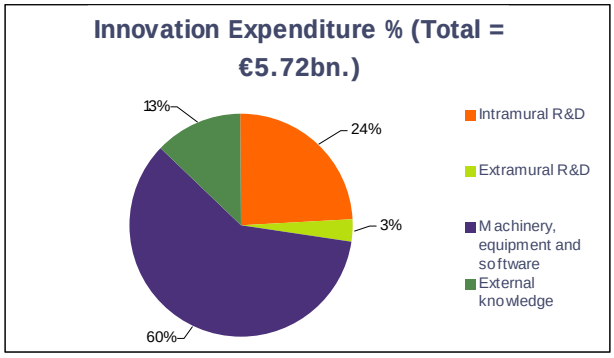
Large "industrial" firms (shown above) employing more than 250 employees were the most active process innovators. Among these firms, 84.3% carried out a process innovation between 2002 and 2004, with 48.4% of large "services" firms being classed as process innovation active.

A total of 64.7% of medium sized industrial firms introduced a new or significantly improved production process, distribution method or support activity for their goods and services. This was ahead of the 36.5% of medium sized service sector firms who were process innovation active. Finally, 41.5% of small-sized industrial firms were process active compared to 35.2% of service sector firms.

Innovation Expenditure

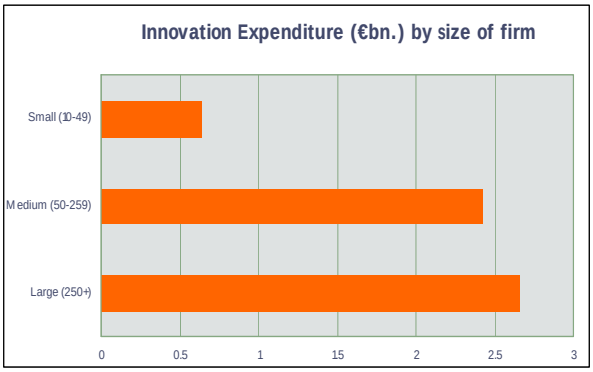
In the survey, firms were asked to indicate if they were active in any of the following categories and to estimate innovation spending on each of the following in 2004: In-house R&D; acquisition of R&D; acquisition of machinery and equipment; acquisition of other external knowledge.

Total spending on innovation activities across the Irish economy is estimated to have been €5.72 billion in 2004. The largest category of expenditure was for the acquisition of machinery and equipment for innovation purposes. Spending on machinery and equipment totalled €3.43bn in 2004, and accounted for 60% of total innovation expenditure in the year.



The next largest category of innovation spending was for research and development carried out in-house, which totalled €1.38 billion in 2004 (24% of the total innovation spend). Spending on R&D which was carried out by others outside the firm totalled €186 million (3.3% of the total). Finally, innovation spending on external knowledge was €730 million in 2004 (12.7% of total innovation expenditure).

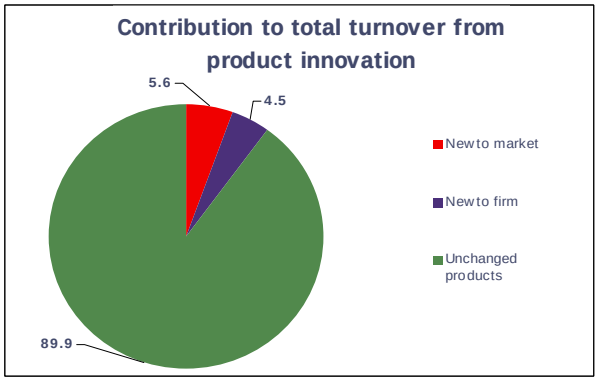
An examination of innovation expenditure by size of firm reveals that the majority of spending is carried out by medium and large firms. Large firms spent €2.7 billion on innovation activities in 2004, which is 46.4% of the total. Average expenditure by large firms on innovation was €8.8 million. Medium sized firms spent €2.43 billion on innovation in the year (42.5% of the total; average expenditure of €1.96 million). Small firms spent €636 million on innovation activities (11.1% of the total; average spend of €137,000).



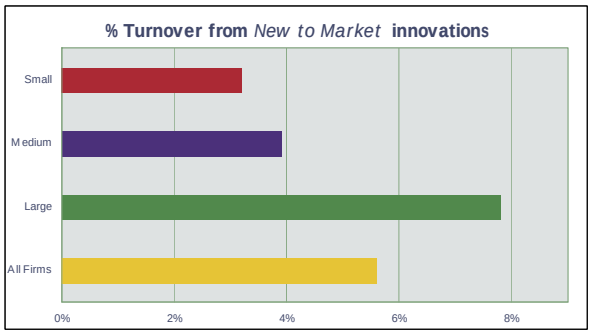
Innovation Turnover

Results from the fourth Community Innovation Survey confirm that innovation activities continue to be a strong driver of turnover and profitability for Irish firms. In the survey, firms were asked to estimate how much total turnover was attributed to product innovations, separated into: new to the market innovations (a measure of novelty and creativity) and new to the firm innovations (those which were adopted by the firm but invented and created elsewhere).

A total of €34.6 billion of turnover was estimated to be a result of product innovation between 2002 and 2004. This amounted to 10.1% of total turnover in 2004. €29.1 billion of this turnover from innovation came from firms in the industrial sector, compared to the €5.5 billion of turnover resulting from product innovation in the services sector. This represented 17.8% and 3.1% of total turnover in these sectors respectively.



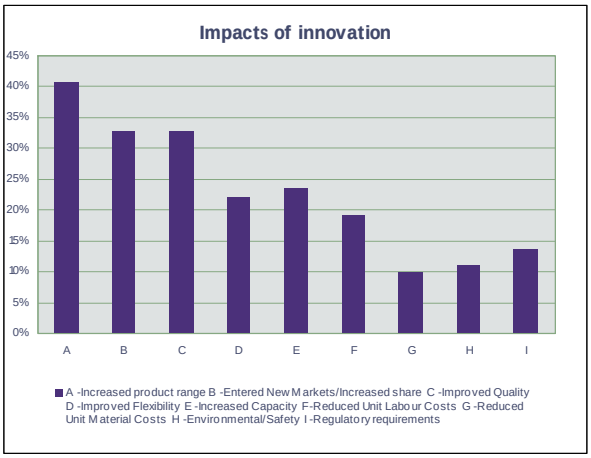
The percentage of total turnover from new to market product innovations is an indicator of creativity and novelty across the economy. Between 2002 and 2004, €19.3 billion worth of turnover was as a result of these novel product innovations (5.6% of total turnover for 2004.



There were variances in the effect of "novel" product innovation on turnover according to size of firm. For large firms, new to market product innovation, was a far stronger driver of overall turnover, contributing 7.8% of total large firm turnover. For medium sized firms, the importance of novel product innovation to overall turnover was a weaker 3.9% of the total. For small-sized firms the contribution to total turnover, for new to market product innovations, was 3.6% of the total.

Innovation Impacts

During the survey, enterprises were asked to rank a list of factors from low to high, on what effects the innovation had made to their operations. The following graph details information on firms who were classed as innovation active and who responded that a given innovation impact factor was ranked high.

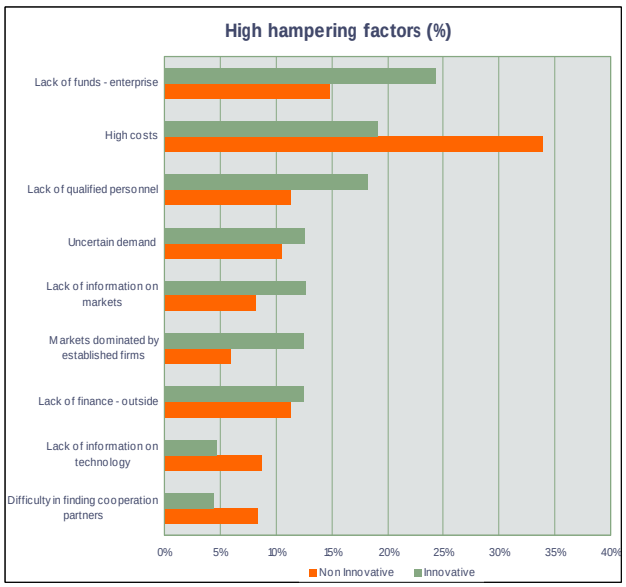


The strongest impact from innovation in activities, for firms operating in Ireland, was classed as improved product range, with 40.6% of firms listing this as a high effect of innovation. The next highest ranked innovation impact was to, enter new markets or increase market share, with 32.8% of firms citing this as a high impact from innovation. Improved quality was the next highest ranking innovation impact.

These three innovation impacts were some way ahead of the second tier of high impacts from innovation, cited by enterprises. The second tier of high impacts included: improved flexibility; increased capacity and reduced unit labour costs. In these next three impacts, between 18% and 22% of firms cited these as high effects from innovation. The final tier of ranked impacts from innovation included reduced unit material costs, environmental reasons and regulatory requirements. These three factors in the final tier of impacts saw between 10% and 14% of firms citing these innovation effects as “high”.

Barriers to Innovation

Firms were also asked to identify factors which hampered their innovation efforts. Nine factors which might have curtailed innovation activities were listed in the questionnaire and firms were invited to rank each of the factors as being of high, medium, low or of no importance. The following graph lists the percentage of firms who listed any of these hampering factors as being of high importance, and divides the data into firms with (red bars) and without innovation activities (blue bars).



For innovation active firms (red bars) the three largest hampering factors were listed as, lack of funds from within the enterprise, high costs and a lack of qualified personnel. Survey results show that 24.3% of innovation active firms cited a lack of funds as a high factor for hampering innovation. A total of 19.1% of active firms cited costs as a high hampering factor and 18.3% cited lack of skills as a high factor.

On average, innovation hampering factors were less important for non-active innovation firms based in Ireland (blue bars) compared to active firms, with the exception of the cost factor, lack of information technology and difficulty in finding co-operation partners.

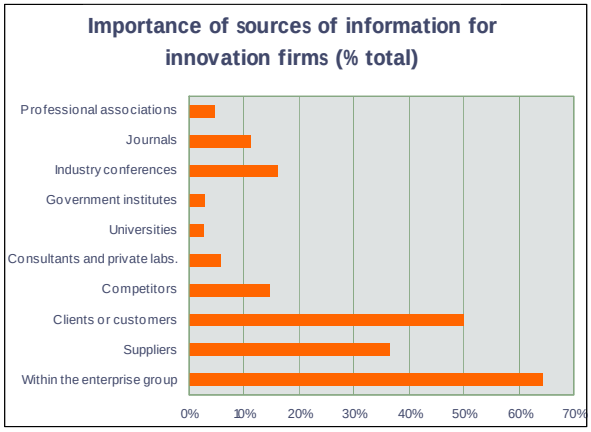
Cost factors were by far the single strongest factor curtailing innovation for non-innovating firms, followed by lack of funds and the lack of qualified staff to carry out innovation activities within the enterprise.

High costs were cited by 33.9% of non innovating firms as a highly ranked factor which hampered innovation activities between 2002 and 2004. This was well ahead of the average number of active firms who recorded cost factors as a significant issue which curtailed innovation activity.

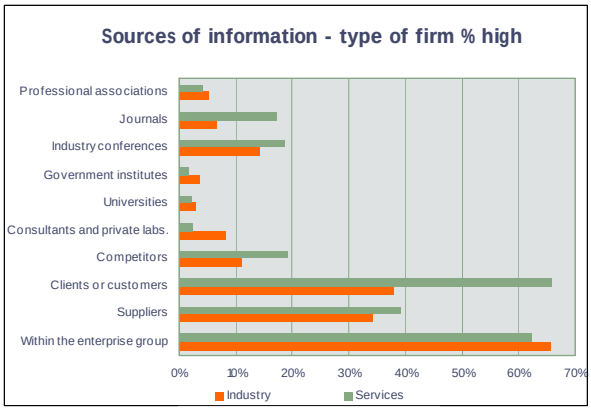
Sources of Information

Enterprises use a wide variety of sources of information when carrying out innovative activities. In the latest innovation survey, enterprises were asked to rank how important a list of sources of information where for innovation activities. Firms were given the option to rank these source factors as of high, medium, or low importance or of no importance at all.

The following chart details the percentage of firms who responded that a given source of information for an innovation activity was ranked highly. The highest ranked source of information for innovation active firms was from within their own enterprise group. Nearly 65% of active firms in the innovation field relied highly on this source of information. Customers, were classified as the next most important source of innovation information by firms operating in Ireland, with 50% citing these sources as of high importance. Suppliers, were the next most important source of innovation information, with 36% citing these sources as of high importance. The least important source of information for innovation was universities.



There are some differences between the importance of sources of innovation information depending on which area of the economy the enterprise is operating in. Across service sector firms, customers are cited as a far more important source of innovation information compared to those in manufacturing (66% vs 37.8%). Professional journals were also a more important source of innovation intelligence in services than manufacturing.

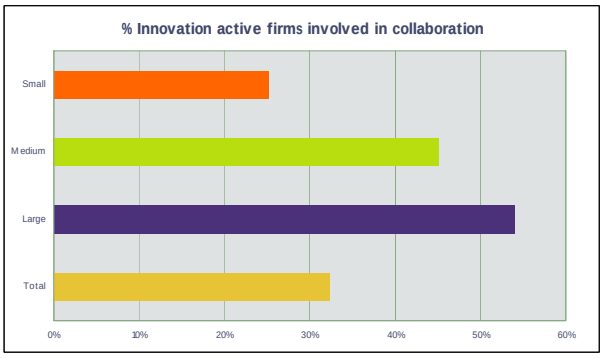


Collaboration

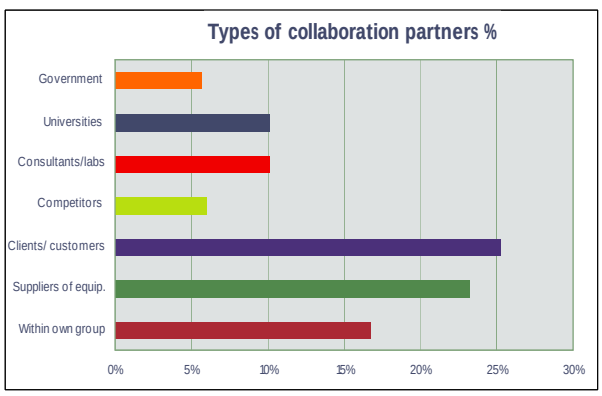
Whilst developing new to market or new to firm product and process innovations, firms may chose to develop these within their own firm or within their enterprise group. Alternatively, firms collaborate with other sources to help develop these innovations. Collaboration is an important tool within the innovation system, as firms aim to meet the rising challenges from the increasingly globalised economy.

This innovation survey asked firms if they were active in collaboration activities, and if so, who were these innovation project partners and where were they located. As can be seen below, just over 32% of innovation active firms, operating in Ireland, were involved in some collaboration activity when developing their innovations.

That said there are wide differences in the amount of collaboration undertaken when examined by size of firm. 54% of innovation active large firms, employing more than 250 staff, were involved in innovation partnerships. This activity ratio falls to 45.1% and 25.2% for medium sized and small-medium firms respectively.



The most important type of collaboration partner for firms in Ireland were clients and customers, with 25.2% of innovation active firms using this type of co-operation. 23.2% of active firms co-operated in innovation development with suppliers, whilst 10.1% were involved in partnerships with universities.



Other Types of Innovation

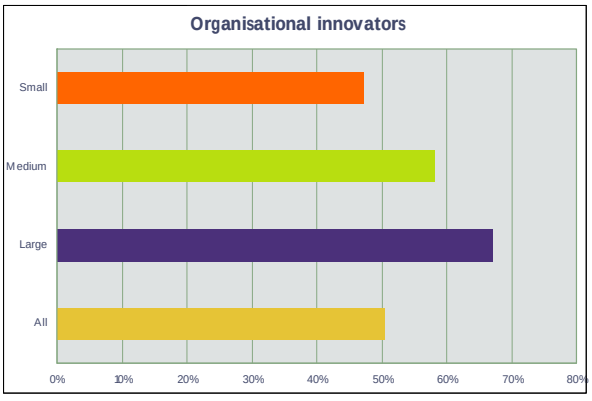
In a change to the previous survey methodology, used in the first three Community Innovation Surveys, the latest survey (CIS4) also probed firms concerning other types of innovation. These included marketing and organisational innovations, which are growing policy areas. Recent revisions to the Oslo Manual have brought these areas into sharper focus across innovation surveys.

These so-called "softer" innovation areas are under development and data is experimental at this stage as further improvements are made. Later in the year further international benchmarking data will be available to allow for more rigorous analysis to be carried out. One particular area of further work will be the analysis of organisational innovation in the workplace of the future being developed at the National Centre for Partnership and Performance (Note 5 - page 10).

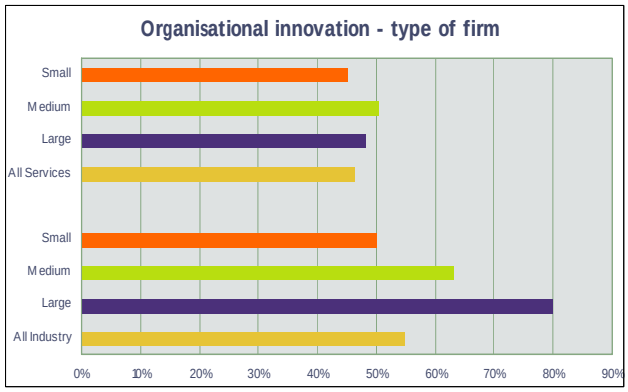
Organisational Innovation

Organisational innovation is defined as "the implementation of new or significant changes in firm structure or management methods that are intended to improve the firm's use of knowledge, the quality of goods or services or the efficiency of work flows".

Just over half of the firms (50.5%) surveyed had carried out an organisational innovation. 38% had introduced a new or significantly improved knowledge management system, 35.8% introduced a change to the organisation of work and 13.6% had been involved in organisational innovations which saw new or significant changes to relationships with other firms.



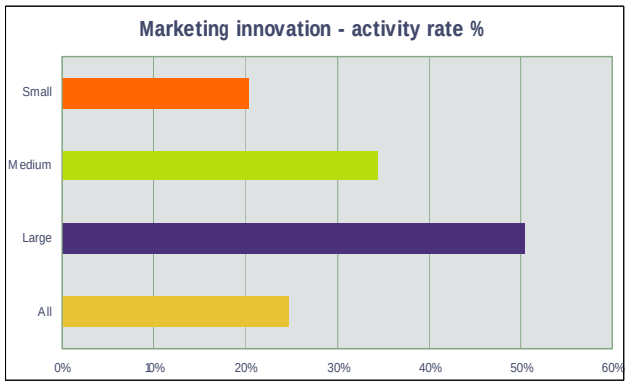
Large firms (employing more than 250 employees) were the most organisational innovation active type of firm. 67.1% of large firms introduced some type of organisational innovation between 2002 and 2004. Medium sized firm's organisational innovation activity rate was 58.1%, and well ahead of the activity rate of small-sized firms, which was 47.4%. Splitting these results further by type of firm and sector of operation reveals that industrial firms were more likely to introduce an organisational innovation, compared to service sector firms. Organisational activity rates were higher for all types of industrial firms (large, medium and small), compared to enterprises operating in the services sectors of the economy.



Marketing Innovation

Improving marketing expertise was one of the key areas identified in the recent Enterprise Strategy Report. A marketing innovation is defined as "the implementation of new or significantly improved designs or sales methods to increase the appeal of goods or services or to enter new markets".

A total of 24.7% of Irish firms carried out a marketing innovation between 2002 and 2004. Within the sample, 19% of all firms had carried out a marketing innovation which saw significant changes to the design or packaging of a good or service. This was higher than the 13.6% of all firms who introduced a marketing innovation which led to new or significantly changed sales or distribution methods.

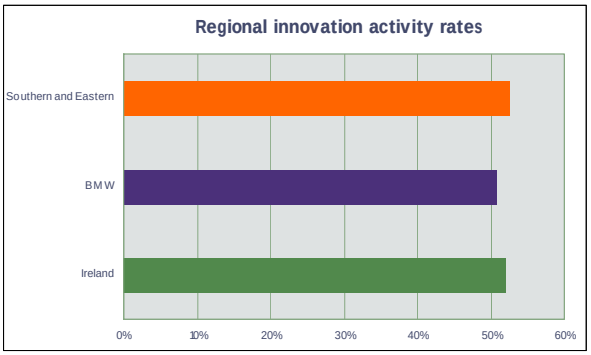


There were significant differences between marketing innovation activity rates according to size of firms. Whilst 50.5% of large firms performed a marketing innovation between 2002 and 2004, this activity rate fell to 34.5% for medium sized firms and 20.4% for small firms (employing between 10 and 49 employees).

Regional Innovation

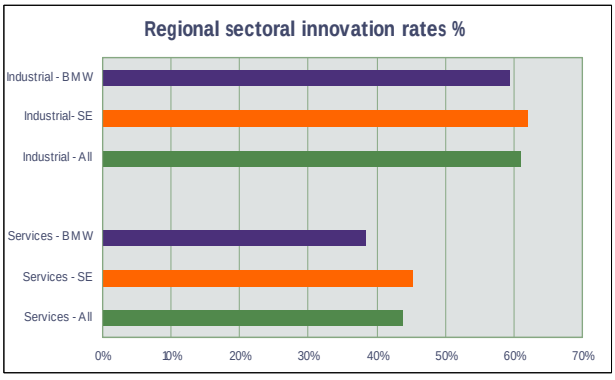
The innovation survey is now able to provide some regional analysis. The data can be broken into the two NUTS II regions – the Southern and Eastern region (SE) and the Border Midlands and West region (BMW).

Data shows that the innovation activity rate is slightly higher in the SE region compared to the BMW region. The percentage of innovation active firms (those who carried out a product or process innovation or abandoned an innovation activity between 2002 and 2004) in the SE region was 52.6%. The BMW regional innovation activity rate was 50.8% between 2002 and 2004, slightly below the overall activity rate of 52.2%.



It is also possible to split the regional innovation activity rate further into the type of firms operating in the regions. Looking firstly, at those firms operating in the industrial sector of the Irish economy, we can see that there is only a marginal difference between the regional activity rates in the two different regions. In the SE region, the innovation activity rate for firms in industrial sectors was 62.1%, compared to the 59.5% innovation activity rate for firms in the BMW region.

Turning to those firms operating in the service sectors of the economy, it can be seen that the difference in regional innovation activity rates is wider among the two regions in comparison to the industrial sector. In the SE region between 2002 and 2004, the innovation activity rate for service sector firms was 45.3%. This was ahead of the activity rate for service sector firms operating in the BMW region, which was 38.4% between 2002 and 2004.



Notes (web-links)

(1) Further Forfás releases on innovation are available for download at:

http://www.forfas.ie/publications/_category/innovation.html

(2) This survey is completed as part of the EU Community Innovation set of surveys and uses the Eurostat core questionnaire used by the EU 25.

(3) Data are gathered obeying the strict international methodological guidelines as laid out in the OECD OSLO manual which can de downloaded at the following: http://www.oecd.org/dataoecd/35/61/2367580.pdf#search=%22oecd%20oslo%20manual%22

(4) Core sectors covered in this survey are firms with 10 or more employees in the following NACE sectors:

10-14 (Mining and Quarrying);

15-37 (Manufacturing)

40-41 (Electricity, Gas and Water)

51 (Wholesale Trade)

60-64 (Transport, Storage and Communication)

65-67 (Financial Services)

72 (Software Consultancy and Supply)

74.2 (Engineering and Technical Consultancy)

74.3 (Technical Testing and Analysis)

(5) Data on organisational innovation will be analyzed further by the NCPP within its workplace for the future strategy.

http://www.ncpp.ie/

Further data queries should be addressed to:

Andrew Stockman

Manager
Science and Technology Indicators Unit
Wilton Park House

Wilton Place
Dublin 2
Ireland
www.forfas.ie *Tel: +353 1 6073000*

Forfás Science and Technology Indicators Unit
Andrew Stockman
Monica Roche
Helena Connellan
Alison Brereton