



# innovation for competitive enterprises (ICE)

driving competitiveness through Innovation  
a partnership approach

## ICE Innovation Benchmark Survey

Briefing Report No. 1





Evidence from academics and businesses alike clearly shows that companies who innovate are much more likely to have higher productivity, and that this leads to greater prospects for long term growth and survival.

This background report on small-to-medium sized enterprises in the relevant Border Regions for ICE provides further confirmation; certain firm-level characteristics (such as size, selling to international markets, adopting a culture based on 'product design' as the most important factor in determining competitiveness) are clearly important in determining whether to invest in innovation-related activities. And as already noted, such characteristics and successful innovation have been shown in a plethora of studies to be strongly linked to productivity.

The ICE programme has been specifically designed with these links in mind. Participating companies are offered an in-depth, hands-on, in-house support programme, designed to help them develop and sustain their potential for innovation, and thus achieve growth. This report also looks at some of the barriers to innovation in the territories covered by ICE; and therefore the need for a programme that actively works to help firms to overcome such challenges.

Funded by the European Union's INTERREG IVA programme, Scottish Enterprise, and the accountable departments of Ireland and Northern Ireland, ICE is a tri-regional (West of Scotland, Northern Ireland and the Six Border Counties of Ireland) collaboration. It is led by Dundalk Institute of Technology in partnership with Glasgow Caledonian University, the University of Glasgow and the University of Ulster.



This project is part-financed by the European Union's European Regional Development Fund through the INTERREG IVA Cross-border Programme managed by the Special EU Programmes Body

## Foreword

This significant and timely report has been prepared following an extensive survey of more than 600 small-to-medium sized enterprises (SMEs) across the three European border regions of Ireland, Northern Ireland and Western Scotland.

The work forms part of the visionary Innovation for Competitive Enterprises (ICE) project which is part-financed by the European Union's Regional Development Fund through the INTERREG IVA Cross-border Programme managed by the Special EU Programmes Body with matching financial assistance from Scottish Enterprise.

The mainstream activities of the ICE programme help small to medium sized companies within the three regions to develop their potential for high impact innovation, thus increasing their competitiveness and improving their profitability. Through the implementation of a hands-on practical in-house Innovation Learning Programme, ICE is helping SMEs to develop that all-important innovation capacity and capability. The programme improves regional competitiveness through the commercialisation of new ideas, products and processes and

technology transfer on a cross border, cross regional basis.

It has been acknowledged that the European Union faces global challenges from emerging economies and the US when it comes to capturing and capitalising on knowledge and technology innovation. Programmes such as ICE are helping to meet that challenge within the three Interreg IVA cooperation regions in Ireland, Northern Ireland and Scotland, by proactively supporting competitiveness in these parts of the EU.

I would like to express my sincere gratitude to the report's author, Professor Richard Harris (University of Glasgow, Scotland), and to the ICE management committee for this comprehensive and important report. This work and its findings are of central importance in delivering the EU's vision for innovation and economic development.



Máire Geoghegan-Quinn

Commissioner for research,  
innovation and science

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## I. Companies in the Survey

In order to provide background information on innovation-related activities in the Border Regions relevant to the ICE project<sup>1</sup>, a telephone survey was undertaken in November 2009 of 606 small-to-medium sized enterprises (SME's) – 200 from each region.<sup>2</sup>

The companies were clients of the three Development Agencies operating in the Border Regions (Enterprise Ireland; Invest Northern Ireland, and Scottish Enterprise), and are less likely to be representative of the population of firms in each area<sup>3</sup>. Rather the survey provides a profile of the firms already being assisted by government agencies, as these are more likely to be relevant to ICE both in terms of the type of

companies recruited to the ICE programme, and in terms of future assistance provided by the public sector to firms in these regions.<sup>4</sup>

The remainder of this section summarises some of the characteristics of the firms in the Benchmark Survey, with an emphasis on any differences across the 3 regions covered. Table 1 shows the industrial breakdown of the firms surveyed; as expected, manufacturing is the dominant sector in all regions, given that government aid has traditionally been concentrated on these types of firms. However, fewer firms in the West of Scotland Border Region belonged to manufacturing compared to the other regions, reflecting both a relatively lower manufacturing presence (cf. Table A)

as well as some movement in recent years on the part of Scottish Enterprise towards assisting firms in other sectors. The information in the table also indicates that on average assisted firms in the West of Scotland were larger in terms of employment, especially in manufacturing but generally in other sectors as well.

However, when measured in terms of their turnover (Figure 1), it can be seen that Scottish firms in the survey were overall not larger in terms of sales when compared to the 6 Southern border counties of Ireland (the percentage of firms with sales of €2m or more was 47.1% in Scotland and 54.5% in Ireland); Northern Ireland had the smallest firms both in terms of sales (Figure 1) and employment (Table 1).

**Table 1:** Comparison of distribution of SME firms in ICE survey by industry and region<sup>a</sup>

Industry	Scotland			Northern Ireland			Republic of Ireland		
	Total employment	No. of firms	% of firms	Total employment	No. of firms	% of firms	Total employment	No. of firms	% of firms
Manufacturing	7,836	86	41.7	4,751	140	70.0	5,591	166	83.0
Construction	854	18	8.7	351	11	5.5	108	6	3.0
Wholesale & Retail trade; repairs	960	26	12.6	140	11	5.5	131	9	4.5
Hotels & Restaurants	342	13	6.3	21	1	0.5	0	0	0.0
Transport, Storage & Communication	1,857	5	2.4	12	2	1.0	22	1	0.5
Real Estate, Renting and Business Activities	964	18	8.7	248	11	5.5	122	5	2.5
Education & Health	595	11	5.3	8	2	1.0	0	0	0.0
Other service activities	630	17	8.3	291	14	7.0	539	2	1.0
All other industries	1,335	12	5.8	97	8	4.0	526	11	5.5
<b>Total</b>	<b>15,373</b>	<b>206</b>	<b>100.0</b>	<b>5,919</b>	<b>200</b>	<b>100.0</b>	<b>7,039</b>	<b>200</b>	<b>100.0</b>

<sup>a</sup>The areas covered in each region are set out in footnote 1

<sup>1</sup>The eligible areas were: all of Northern Ireland; 6 Southern border counties of Ireland (Co. Louth, Co. Monaghan, Co. Cavan, Co. Leitrim, Co. Sligo and Co. Donegal); and Western Scotland (Dumfries & Galloway, North and South and East Ayrshire, Inverclyde and Renfrewshire).

<sup>2</sup>The extra 6 companies were in Scotland.

<sup>3</sup>Table A in the appendix shows the population of SME's in the West of Scotland (based on data from the Office for National Statistics), and how this compares to the distribution obtained in the survey for Western Scotland. As can be seen, returns from the ICE Survey show that Scottish Enterprise is more likely to assist manufacturing firms, even though they only account for 13.4% of all firms in the West of Scotland Border Region. The other factor worth noting from Table A is that firms assisted by Scottish Enterprise are likely to be on average larger than those not assisted (the average size of all firms in the region was 37 while the average size in the ICE Survey was 75 employees).

<sup>4</sup>Note, the three Development Agencies operating in the Border Regions gave us access to their full list of SME client companies operating in the Border Regions (1,334 for NI; 346 for ROI; and 495 for Scotland). A random sample of these was used for the telephone surveys and we have no evidence that suggests our samples were not representative of the population of client firms operating in each region.

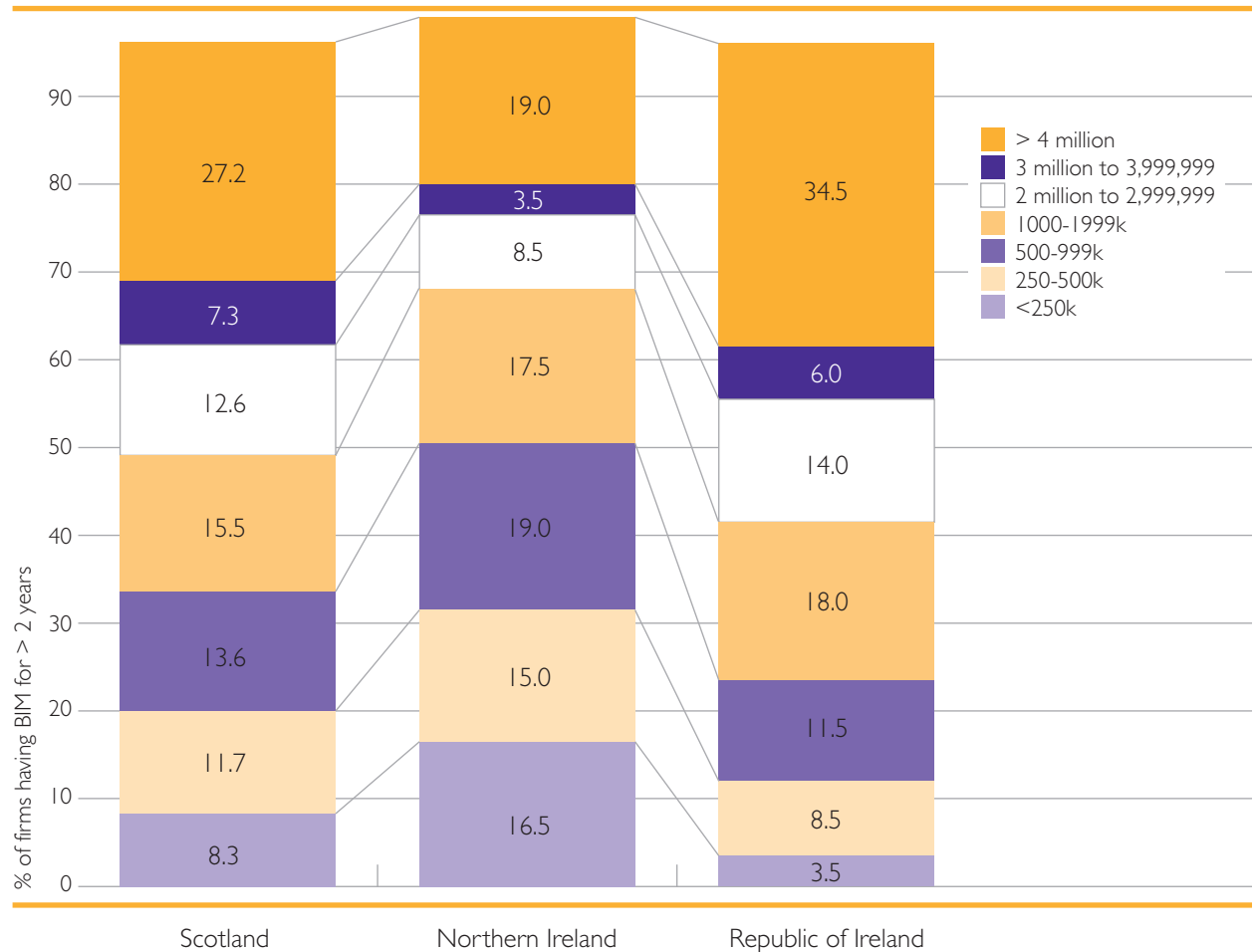
**Figure 1:** Sales turnover (€) in SME firms in ICE survey by region <sup>a,b</sup>

Table 2 provides information on certain characteristics of the firm often associated with differing levels of productivity (and thus long-run growth). Northern Ireland companies were on average 'younger' (i.e., had been in business for a shorter period) and smaller:

A smaller percentage of Scottish firms were family-owned (defined as 50% or more of the ownership residing within the family). In terms of sales, the majority of goods and services produced went to other firms and households within the same country, while around 14% of sales went to customers outside the British Isles (there was little difference across the three Border

Regions with respect to the importance of exporting).

The differences across the Border Regions in terms of the percentage of sales sold outside the country but within the British Isles is 100% minus the two figures presented in Table 2. For Scotland this is 28.9% (of which 23.6% of this was sales to England and Wales – there was little to Northern Ireland or the Republic of Ireland); for Northern Ireland the figure is 39.9% (little of which went to Scotland, but 19.7% and 15.6% went to the Republic of Ireland and England & Wales, respectively); and for the Republic of Ireland the figure is 22.6% (again there was little trade with Scotland while 10.5% and 8.9%

# 606

small-to-medium sized enterprises (SME's) took place in this survey

# 54.5%

of firms surveyed had sales of €2m or more

# 23%

of firms thought that competition had increased significantly

headquartered in England & Wales), while far fewer of the SME's in the Irish Border Regions (North and South) were externally-owned – which is perhaps a little surprising for Northern Ireland SMEs (assisted by Invest Northern Ireland).

The next four rows in Table 2 represent the answers given to the question “in the next 3-5 years what single most important factor will provide the competitive edge of your business”. Overall some 30% of companies in the ICE survey answered that ‘product design’ (i.e., quality factors) was most important (there is little difference across the Border Regions, although firms in the Republic of Ireland were slightly more likely to put this factor highest); while nearly 27% overall thought that ‘cost effectiveness’ was most important (with fewer/more firms in Northern/Republic of Ireland putting this factor first).

The other two factors, which were most important for just over a quarter of firms in the survey, were

process technology and marketing (with respect to the latter, there was a more significant difference between firms either side of the Irish Border).

Lastly, Table 2 shows that around 23% of firms thought that competition had increased significantly in the three years leading up to the survey; this was especially evident in the 6 Southern border counties of Ireland – where one-third of firms believed that competition was much stronger – and probably reflects the greater impact of the recent recession in Ireland vis-à-vis the UK.

As to whether firms thought that their performance was significantly better than their rivals in the 12 month period before the survey, only around 10% of firms operating in the Irish Border regions thought this to be the case, while over 18% of Scottish firms answered that they experienced significantly better performance.

# 18%

of Scottish firms thought that their performance was significantly better than their rivals

was sold to Northern Ireland and England & Wales, respectively).

As to the percentage of firms that were ‘foreign’ owned, some 15% of Scottish Border Region companies had their company headquarters outside of Scotland (2/3rds of this figure represented companies

**Table 2:** Certain characteristics of SME firms in ICE survey by region<sup>a</sup>

	Scotland	Northern Ireland	Republic of Ireland	All firms
Age (in years)	28	21	34	28
Average FTE employed	75	30	35	47
% family-owned	44.7	64.0	62.5	56.9
% sales within own country	55.8	46.3	63.6	55.2
% of sales sold outside British Isles	15.3	13.9	13.7	14.3
Headquarters outside region	15.1	6.0	3.0	8.1
Competitive edge: product design <sup>b</sup>	28.2	29.5	34.0	30.5
Competitive edge: cost effectiveness <sup>b</sup>	27.7	22.5	30.0	26.7
Competitive edge: process technology <sup>b</sup>	14.1	15.5	13.5	14.4
Competitive edge: marketing <sup>b</sup>	15.5	20.5	8.5	14.9
Over last 3 years competition has increased significantly <sup>b</sup>	17.5	18.5	33.0	22.9
In last year overall performance significantly better than rivals <sup>b</sup>	18.4	10.0	9.5	12.7

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Figures are % of firms in each region reporting ‘yes’ to the question.

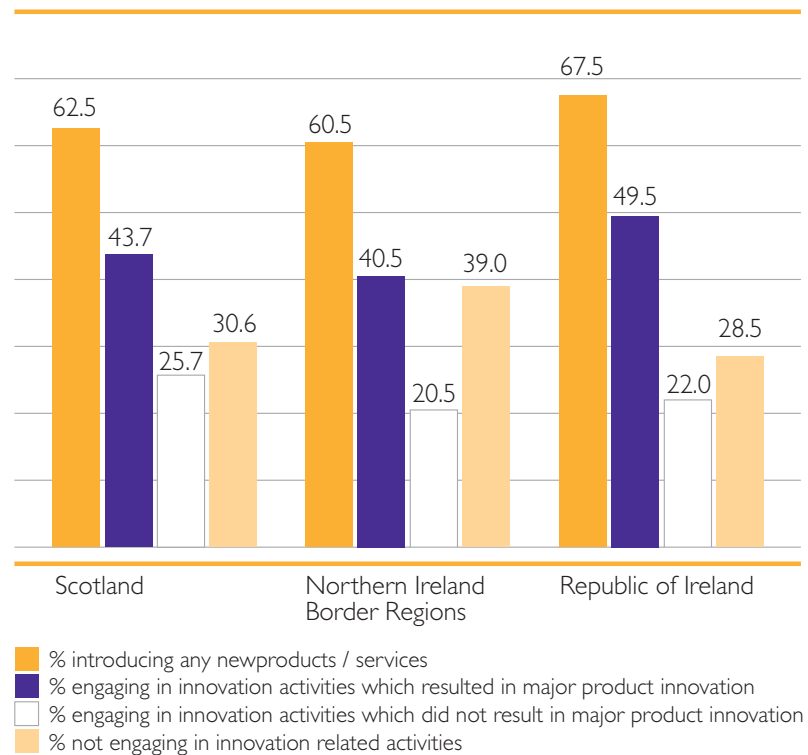


## 2. Importance of Product and Process Innovation

Firms in the survey were asked a series of questions about whether they had introduced any new products/services in the last 3 years; whether they were involved in innovation related activities (defined for the purpose of the survey as “committing resources to developing new products, processes or services and/or significantly improving existing products, processes or services, or developing new niches for the firm); and whether such innovation activities had resulted in any major product or process innovations introduced into their plants in the last 3 years. Note, the definition of innovation related activities did not mention R&D specifically (to avoid the use of a narrow interpretation of the resources they may have committed in this area<sup>5</sup>), and firms were also allowed to distinguish between major and minor innovations, and those developed locally as opposed to in other branches of the firm located outside the Border Regions.

Figure 2: Product innovation in SME

Figure 2: Product innovation in SME firms in ICE survey by region<sup>a</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

firms in ICE survey by region

Figure 2 shows that overall some 63% of firms stated that they had introduced new products/services in the last 3 years, with the highest level of innovation in the Border Region of the Republic of Ireland (67.5%) and the lowest in Northern Ireland (60.5%). However; when firms in the survey were asked if they were engaged in innovation related activities, and whether the commitment of such resources had resulted in any major product innovations in the last 3 years, only 45% answered 'yes' (again with the highest percentage – 49.5% – being located in Rol); thus overall some

18% of firms reported that they introduced new products/services but these were either 'not major' and/or had not been as a result of innovation activities undertaken in the local firm.

The more important figure is whether there were major product innovations locally, resulting from an investment of local resources in innovation activities.

Thus Figure 2 also shows the percentage of firms engaging in innovation activities which did not result in a major product innovation (overall 23% of firms were in this category), as well those not involved

<sup>5</sup> We did ask firms to tell us how important was the presence of an R&D department in the design and development process surrounding the introduction of new products/services in the last 3 years; the percentage answering that it was crucial were 41.1%, 47.9% and 62.2%, respectively, in Scotland, Northern Ireland and the Republic of Ireland. See Figure 4 (below) to put these figures into perspective.

63%

of firms stated that they had introduced new products/services in the last 3 years

23%

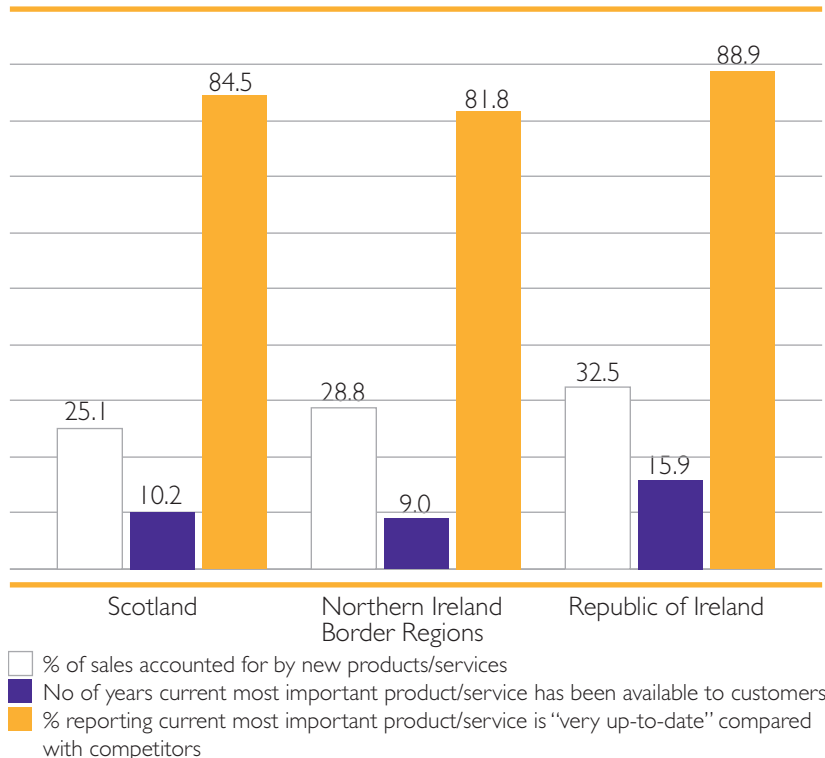
of firms engaged in innovation activities which did not result in a major product innovation

in innovation (33% of all firms, but relatively much higher in Northern Ireland at 39% compared to 28.5% of firms located in the Republic of Ireland).<sup>6</sup> In summary, some 55% of the assisted firms in the ICE survey did not produce major local product innovations, with those based in Northern Ireland having the worst outcome as nearly 60% did not innovate. Since product innovation rates (both major and minor and from all sources) of around 63% overall might seem fairly high, firms were further asked to state: (i) what percentage of their current turnover was accounted for by the new products/services introduced in the last 3 years; (ii) how many years has the current most important product/service been available to customers (without any fundamental or major change in design or

specification); and (iii) how modern is their current most important product/service when compared to their competitors. Figure 3 presents the results.

Despite introducing new products/services, less than one-third of turnover was attributable to these innovations – 29% overall, although with over 32% of sales in the Republic of Ireland firms associated with product innovations and only some 25% in Scottish firms. Moreover, the number of years that the firm's most important current product/service has been available to customers is nearly 12 years (and almost 16 years in the RoI), which is a significant period when technology product life-cycles have been falling in recent years. Overall, the low level of sales attributed to new

**Figure 3:** Products/services of innovating SME firms in ICE survey by region <sup>a,b</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms that introduced new products/services in last 3 years are included.

<sup>6</sup> The last three sets of figures in Figure 2 for each region add to 100%.

# 55%

of the assisted firms in the ICE survey did not produce major local product innovations

# 60%

of Northern Irish firms said they did not innovate

# 29%

less than one-third of turnover was attributable to introducing new products/services

products/services, and the considerable 'age' of the most important product/service, suggests that assisted firms in the survey were mostly dependent on sales from relatively more established products and services.

Figure 3 also shows that despite relying on older products/services, the firms in the survey believe that, when compared to their competitors (most of which are local rather than overseas SMEs), they sell very up-to-date outputs. Assuming that they are sufficiently well-informed about their rival's products, this suggests that most of the products/services sold in the SME sector in the Border Regions are becoming obsolete.

The firms in the ICE survey that had

**Table 3:** Attitudes towards products/services in innovating SME firms in ICE survey by region <sup>a,b</sup>

	Scotland	Northern Ireland	Republic of Ireland	Total
Committed to making existing products obsolete by introducing new ones	Disagree	Disagree	Disagree	Disagree
Regularly compare products with competitors	Agree	Strongly agree	Strongly agree	Agree
Products have high level of technology	Agree	Agree	Agree	Agree
Products use better technology than competitors	Neutral	Agree	Agree	Agree

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms that introduced new products/services in last 3 years are included.

introduced new products/services in the last 3 years were also asked about their attitudes towards their existing products/services; firstly, they were asked whether they were committed to making their existing products and services obsolete by introducing new ones. Replies were coded as follows: strongly agree = 2;

agree = 1; neither agree/disagree = 0; disagree = -1; strongly disagree = -2. This meant that the average response across the firms in each Border Region was represented by a single overall value which was then converted back to the nearest statement to which it corresponded (e.g., an average response of -0.66 was rounded to -1, which equates to 'disagree'). Table 3 shows that on average firms disagreed with the first statement which was intended to gauge the extent to which they were committed to a process of continuous product development. This result is in accordance with the information presented in Figure 3 that firms were committed to their existing (relatively more obsolete) products/services.

However, respondents stated that they kept a close watch on their competitors (especially in Northern Ireland and the Republic of Ireland); they generally believed their products/services had a high level of technology built into them; and their products/services overall used better technology than their competitors (the exception here is Scotland where responses were on average 'neutral' on the last statement in Table 3). Again, this suggests that the assisted firms in the survey were 'one-step-ahead' of the local competition, but overall Figure 3 and Table 3 suggests that firms in the ICE survey involved in product innovation were relatively risk-

adverse towards making a strong commitment to introducing new products and services

Lastly in this section we report what firms stated were the most important factors that influenced the design and development process associated with introducing their most important new product/service in the last 3 years. Figure 4 shows that cooperation with customers and production staff at the establishment were the most crucial factors (on average between 60-62% of all firms in the survey rated these as crucial); these factors reflect the internal and external knowledge, capabilities and resources available to the firm with 'cooperation with customers' an indication of the importance of external knowledge and 'production staff' representing internal influences. The next two most important factors (rated as crucial by 51-55% of all firms) were (i) market testing/evaluation; and (ii) the importance of having an R&D department; and again these reflect external and internal processes impacting on the firms. Financial resources (which are often thought to be one of the most binding constraints on innovation activities), were rated as crucially important by around 45% of firms (this was higher at 51.2% of firms in Northern Ireland, probably reflecting the overall smaller size of surveyed SMEs in this Border Region), while

# 60%+

of all firms in the survey rated cooperation with customers and production staff as crucial

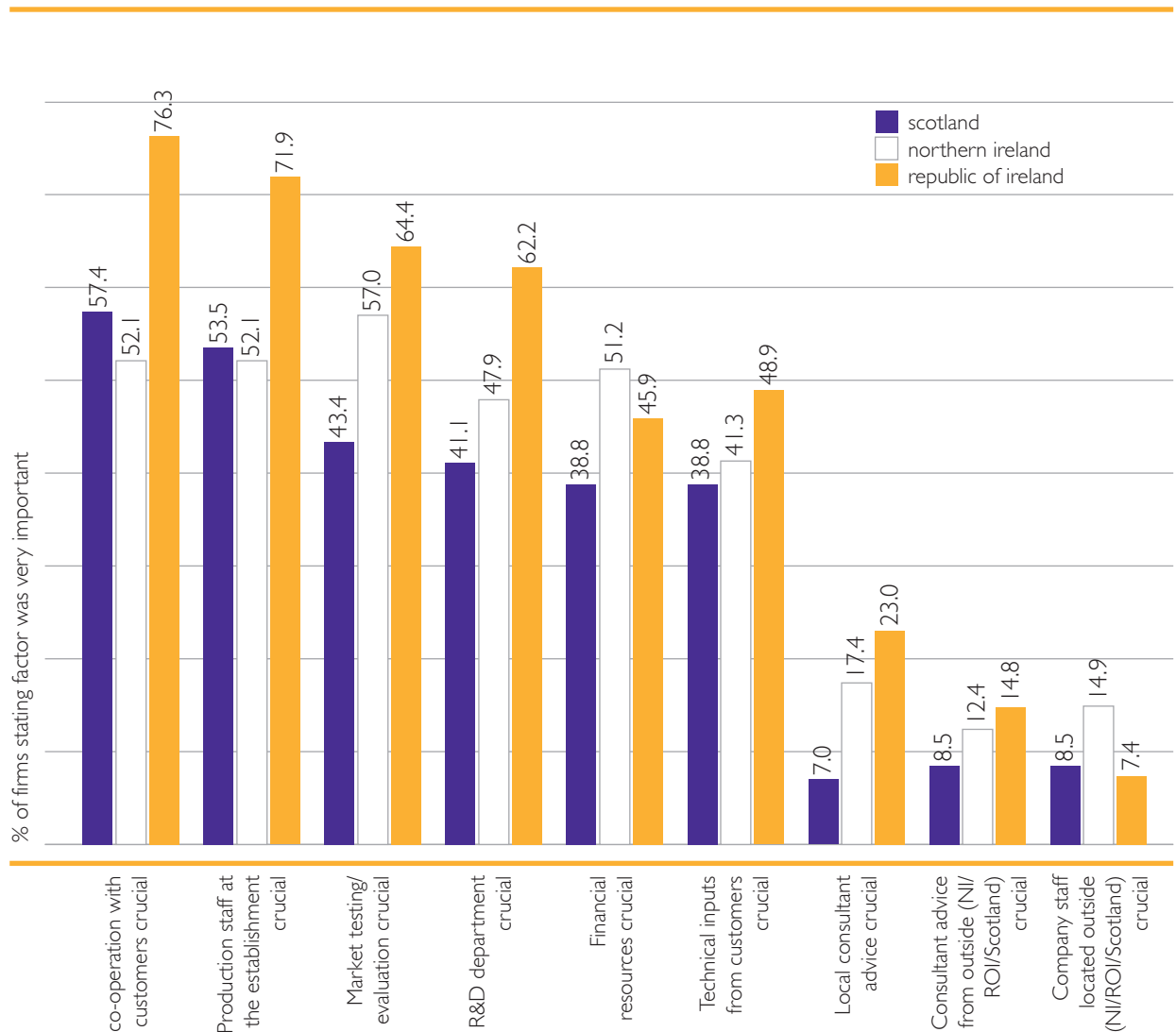
# 51.2%

of firms in Northern Ireland rated financial resources as crucially important

# 51%+

of all firms surveyed seen market testing/evaluation as an important factor

**Figure 4:** Most important factors influencing new product/service design and development in innovating SME firms in ICE survey by region <sup>a,b</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms that introduced new products/services in last 3 years are included.

technical inputs from customers (as opposed to cooperation) is rated overall as crucial by around 43% of all firms in the survey. Other factors (the importance of advice from local and external consultants; and the role of company staff located outside the region) were significantly less important as crucial factors influencing the innovation process (especially in Scotland).

One other major result that stands out in Figure 4 is that on almost every factor; more firms in the Border Region of the Republic of Ireland rated their influence as being crucial when compared to the other two regions. This suggests that ROI firms were more aware of the importance of these factors, which could reflect a number of influences such as: assisted manufacturing firms dominate this Border Region (Table

1); their relatively larger size in terms of turnover (Figure 1); the greater concentration of sales in local (ROI) markets and the greater importance placed on product design, as well as concerns expressed about increasing competition (Table 2); and, lastly, a slightly greater concentration on innovation activities (Figure 2) and reliance on these new goods/services in terms of their turnover (Figure 3).



### 3. Barriers to Innovation

This section uses the information in the ICE Benchmark Survey to look at which factors limit the ability of SME firms in the Border Regions in taking part in innovation related activities. We begin by considering the reasons stated by non-innovating firms as to why they were not currently engaged in committing resources to developing new or improving existing products/services, or developing new niches for the firm. The remainder of the section then compares innovators and non-innovators in terms of a set of factors such their characteristics (such as size, market orientation, and approach to competitiveness); where the firms are in terms of their (product) lifecycle; their strategic focus; leadership approach; use of business improvement methods; the

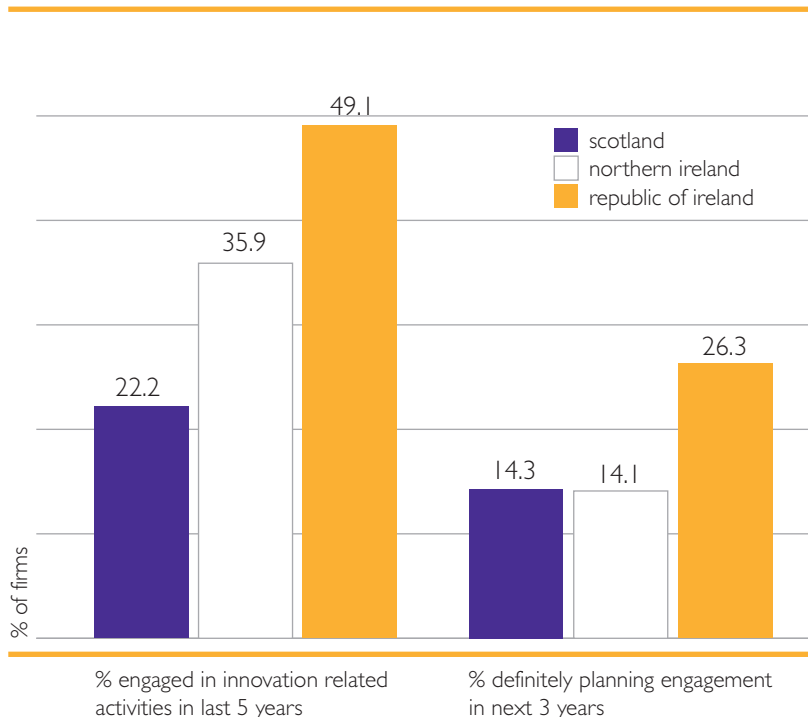
incorporation of internal and external knowledge; and the importance they place on networking with other organisations.

#### (a) Reasons for not undertaking innovation related activities

Figure 2 showed that 33% of all firms were currently not engaged in innovation related activities (relatively much higher in Northern Ireland at 39% compared to 28.5% of firms located in the Republic of Ireland). These firms were asked if they had been involved in such activities at any time in the last 5 years, and whether they would expect to be involved at any time in the next 3 years.

Figure 5 shows that overall just over 35% of firms stated that they had been involved in innovation related

**Figure 5:** Importance of innovation activities in non-innovation active SME firms in ICE survey by region <sup>a,b</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms stating they are not currently engaged in innovation related activities are included (see Figure 2)

# 43%

of all firms in the survey rated technical inputs from customers as crucial

# 35%

of firms stated that they had been involved in innovation related activities in the last 5 years

# 22%

of scottish non-innovating firms had not had any previous experience in the past 5 years

activities in the last 5 years, although there is a strong regional difference with only 22.2% of Scottish firms having any previous involvement compared to over 49% of Southern Irish firms. Thus in the case of Scotland nearly 78% of non-innovating firms had not had any previous experience in the past 5 years; and Figure 5 shows that only some 14% of these firms planned any definite engagement in the next 3 years. More firms in Northern Ireland have had previous experience (just over one-third of this sub-group), but again only some 14% were planning any innovation-related activity in the next 3 years.

In contrast, nearly 50% firms in the 6 Southern border counties of Ireland had previous experience and some 26% of them were definitely

planning to re-engage in the next few years. In conjunction with Figure 2, this suggests that firms in the Republic were not only currently more likely to be involved in innovation, but the experience and commitment to innovation was higher in non-innovators.

Firms not engaged in innovation related activities were asked for their reasons; i.e., they were asked to rate several statements in terms of

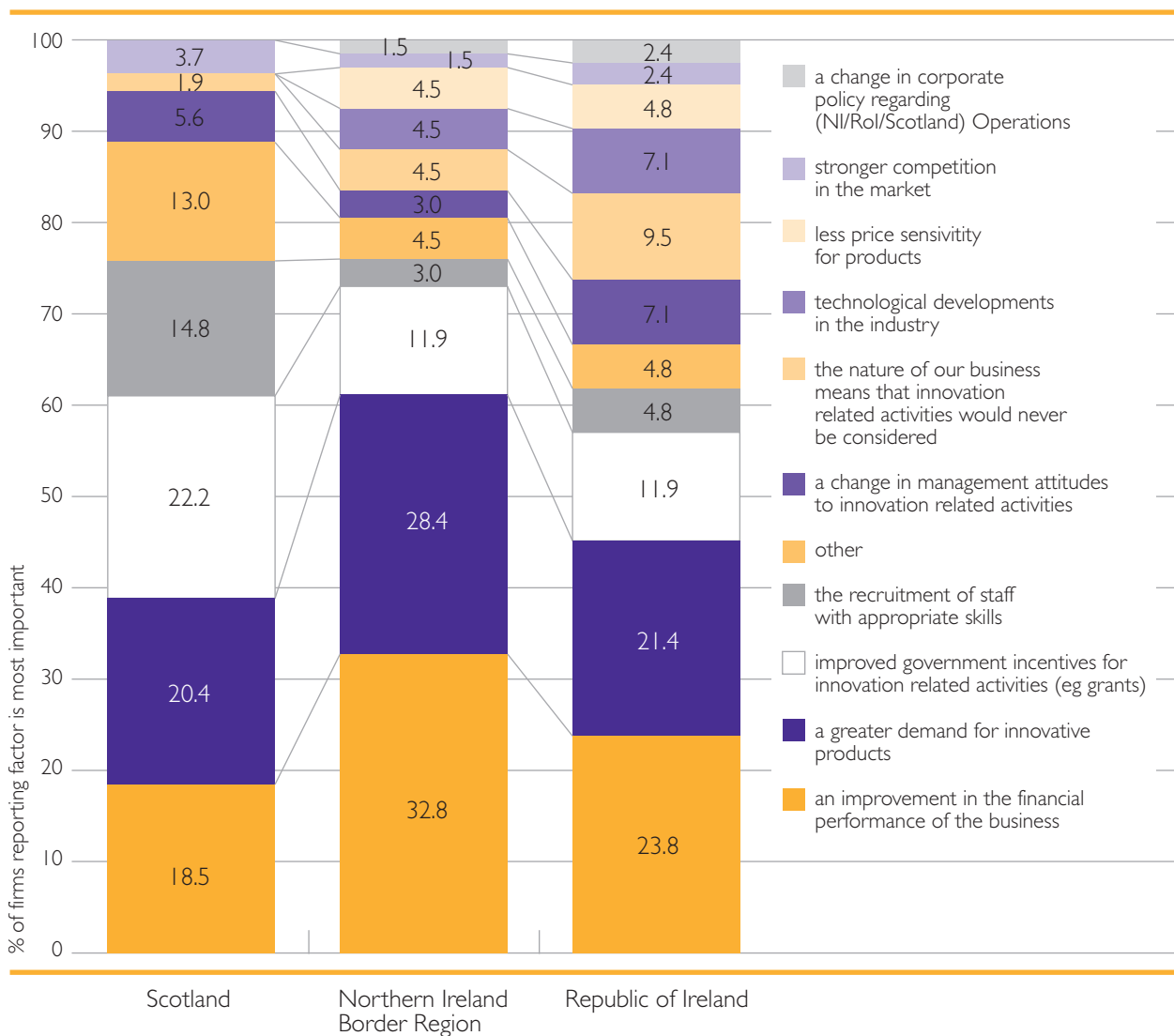
whether they agreed or disagreed.

Using the same coding and approach as above (cf. Table 3), Table 4 presents the results. For Scottish firms, there is little indication of why they do not engage in innovation; the only area where there was any positive response is where they agree that lack of finance for innovation is a problem. Firms in the others regions also state that this factor limited their involvement in

innovation related activities.

Firms in the Irish Border Regions provided a clearer picture of their lack of engagement in innovation activities; in both regions they disagreed with the statements that it was a corporate decision not to undertake this type of investment, that senior management do not regard innovation as a strategic priority, and that there was a lack of appropriate skills in the business; and

**Figure 6:** Most important factors likely to encourage innovation related activities in the future in non-innovation active SME firms in ICE survey by region <sup>a,b</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms stating they are not currently engaged in innovation related activities are included (see Figure 2).

in the case of firms in the Republic, they also disagreed that charging more for new products/services (reflecting any quality enhancement and thus recovering the investment in innovation activities) would make them uncompetitive. Rather they agreed that along with a lack of finance, market risk and uncertainty was a problem. Thus in the Irish firms, not committing resources to innovation activities involved more demand- rather than supply-side issues.

This is confirmed in Figure 6 which reports the factors that non-innovating firms believed to be most likely to encourage them to undertake innovation related activities in the future. The two most important were (i) an improvement in the financial performance of the business (especially for firms in

Northern Ireland and much less so for Scottish firms) and (ii) a greater demand for innovative products.

Related to finance, the third most important factor was improved government incentives for innovation (e.g., grants), which was nearly twice as important in Scotland. Together these 3 demand-side reasons accounted for the majority of responses across the 3 regions (especially in Northern Ireland); supply-side factors were generally less relevant, with the most important being the need for staff with the appropriate skills in Scotland (nearly 15% of firms stated this was most important); and the nature of the business being unsuited for innovation in Irish firms (especially in the ROI). Other supply-side factors were also relatively more important for firms in the

# 15%

of firms in Scotland seen the need for staff with the appropriate skills being most important

# 7.1%

of firms in the Republic of Ireland seen the need for technological developments in the industry as important

Republic, such as technological developments in the industry (7.1% of Irish firms) and management

**Table 4:** Reasons for not undertaking innovation related activities in non-innovation active SME firms in ICE survey by region <sup>a,b</sup>

	Scotland	Northern Ireland	Republic of Ireland	Total
The nature of our product or production process does not require or justify expenditure on innovation related activities	neutral	neutral	neutral	neutral
It is a corporate decision not to invest in innovation related activities in (NI/ROI/Scotland)	neutral	disagree	disagree	disagree
External economic/market conditions associated with risk and uncertainty prevent us from undertaking innovation related activities	neutral	agree	agree	agree
Lack of access to finance (including government aid) restricts our ability to undertake innovation related activities	agree	agree	agree	agree
There is limited competition in the market for our products (i.e. our product is highly price sensitive), so we do not engage in innovation related activities	neutral	neutral	disagree	disagree
We are unable to engage in innovation related activities due to lack of appropriate skills within the business	neutral	disagree	disagree	neutral
There is too long a time lag between undertaking innovation related activities and generating financial returns	neutral	neutral	neutral	neutral
It makes more sense to wait and copy the innovations of competitors than undertake these activities ourselves	neutral	neutral	neutral	neutral
Senior management do not regard innovation related activities as a strategic priority	neutral	neutral	neutral	neutral
We are unable to develop links with external bodies/organisations that would stimulate innovation related activities	neutral	neutral	neutral	neutral

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> Only firms stating they are not currently engaged in innovation related activities are included (see Figure 2)

# 57%

of Northern Irish family owned businesses do not engage in innovation related activities

# 22%

of sales are achieved outside the British Isles by firms who engage in major product innovation

# 5.4%

of sales are achieved outside the British Isles by firms who do not engage in major product innovation

attitudes to innovation related activities (7.1%).

In summary, the results presented in this sub-section point to a general lack of relevance of innovation related activities for those one-third of firms not currently engaged in such investment. If they were to become more profitable, and if they could see a greater likelihood that their customers would be prepared to pay more for more innovative products (and/or government are willing to offset the riskiness and uncertainty associated with innovating), then the results show that they might see some advantages in spending more on innovation related activities.

However, it might also be that these firms simply lack the culture and

capabilities to innovate, which means they continue to produce lower technology products. Their attitude to innovation is likely to be in part determined by their characteristics (such as size, market orientation, and approach to competitiveness); where the firms are in terms of their (product) lifecycle; their strategic focus; leadership approach; use of business improvement methods; the incorporation of internal and external knowledge; and the importance they place on networking with other organisations. Thus it is to these factors that we now turn.

### (b) Innovation activities and characteristics of firms

Whether a firm is involved in innovation related activities (resulting in a major product innovation in the last 3 years or no product innovation) or not, is likely to be related to its characteristics (such as size, market orientation, and approach to competitiveness). Thus certain of the characteristics listed in Table 2 are related to innovativeness (Figure 2) to see if there is any link between them.

Although a certain characteristic may vary across innovation sub-groups, this does not mean there is necessarily a strong statistical link; thus, we test the (null) hypothesis that there is no trend either upwards or downwards across the sub-groups<sup>7</sup> to see if we can reject this hypothesis at a high level of significance (1%), medium significance (5%), or low significance (10%). Rejecting at any of these levels shows there is a statistical trend, but obviously a strong(er) rejection of the hypothesis requires a high(er) level of significance.

Table 5 shows that generally larger firms (in terms of their employment size) are more likely to be successful

at innovation; i.e., there is a positive link between firm size and moving from not engaging in innovation related activities to producing a major product innovation.

The link is strongest in the Republic of Ireland firms that were surveyed; weaker in Scottish firms (but still significant); but no significant relationship is found for firms in Northern Ireland (even though employment size changes across the sub-groups with the expected pattern). In part this positive relationship between size and innovativeness suggests that larger firms have more resources for investing in innovation related activities.

Generally there is little relationship between the number of years the firm has been operating and innovativeness. However, there is a strong negative (positive) link between the amount sold within the country (amount exported) and successful innovation related activities. This is as expected, as there is a well established literature that shows that exporting firms have higher levels of productivity (Harris and Li, 2009).

With the exception of the Republic of Ireland, being family-owned is associated with lower levels of innovativeness. And lastly, firms who believe that their competitive edge in the next 3-5 years will come from product design (cost effectiveness) are much more (less) likely to engage in successful innovation related activities, reflecting a different strategic approach between such firms.

### (c) Linkages to firm activities

The ICE Benchmark Survey also asked respondents a series of question related to (i) where they were in the lifecycle of the

<sup>7</sup>That is, we might expect larger firms to be more likely to engage in innovation related activities and produce a product innovation, medium-sized firms to engage in innovation related activities and not produce a product innovation, and smaller firms to not engage in innovation related activities.

**Table 5:** Characteristics of firms and innovation related activities in SME firms in ICE survey by region <sup>a, b, c</sup>

	FTE Employment	Age of firm (years)	% of sales sold		% family owned	Competitive edge	
			within own country	outside British Isles		product design	cost effectiveness
<b>Scotland</b>							
Major product innovation	95	31	37.1	23.9	37.8	45.6	18.9
No major product innovation	75	26	58.0	13.8	41.5	17.0	26.4
Not engaging in innovation related activities	45	27	80.8	4.3	57.1	12.7	41.3
	*		***	***	**	***	***
<b>Northern Ireland</b>							
Major product innovation	34	16	34.3	23.2	58.0	42.0	9.9
No major product innovation	32	30	49.3	7.8	58.5	26.8	22.0
Not engaging in innovation related activities	24	22	57.1	7.3	73.1	17.9	35.9
		*	***	***	**	***	***
<b>Republic of Ireland</b>							
Major product innovation	43	29	57.9	19.3	61.6	38.4	24.2
No major product innovation	34	42	61.0	13.8	65.9	45.5	22.7
Not engaging in innovation related activities	23	36	75.8	3.9	61.4	17.5	45.6
	**		***	***		**	***
<b>All firms</b>							
Major product innovation	57	26	43.8	22.0	52.6	41.9	18.1
No major product innovation	49	32	56.4	12.0	54.3	29.0	23.9
Not engaging in innovation related activities	30	28	70.0	5.4	64.6	16.2	40.4
	***		***	***	***	***	***

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> All firms are included (see last 3 categories for each region in Figure 2).

<sup>c</sup> Stars indicate ability to reject null of no trend across innovation sub-group at \*=10%/\*\*=5%/\*\*\*=1% significance level.

product/service they sold; (ii) the strategic focus of the firm; (iii) leadership; (iv) culture; (iv) the use of Business Improvement Methods; (v) how internal and external knowledge was acquired and incorporated in the firm; and (vi) networks.

In Tables 6 – 8, only those questions that provided (statistically significant) different answers across the 3 innovation related activities sub-groups (as used in Table 5) are included; the other questions asked

– where there is no (statistically significant) difference – are excluded (see the survey questionnaire to identify which questions these were). All the questions asked respondents to rank from: strongly agree (coded 2) through to strongly disagree (coded -2)<sup>8</sup>. The average result for each innovation sub-group is reported in Tables 6 – 8, but unlike Tables 3 and 4 these are not then converted back to the nearest statement to which it corresponded.<sup>9</sup>

In addition to reporting the average scores of respondents in Tables 6 – 8, we have also tested the (null) hypothesis that there is no trend

# 57

average number of employees in firms who engage in major product innovation

**Table 6:** Lifecycle, strategic focus and leadership linked to and innovation related activities in SME firms in ICE survey by region <sup>a, b, c</sup>

Whether firm strongly agrees (coded 2) to strongly disagrees (coded -2) with statement:	Scotland			Northern Ireland			Republic of Ireland		
	(1) <sup>d</sup>	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
The decision facing owners at this stage is to keep the company stable and profitable	0.344	0.434	0.651	0.642	0.707	1.000	0.626	0.727	0.860
The company has a narrow range of products and markets	-0.244	0.113	0.397	0.099	0.317	0.128	-0.242	0.227	0.754
The company continually searches for new market opportunities	1.478	1.264	0.984	1.654	1.512	1.436	1.455	1.591	1.105
The organisation seldom makes adjustments of any sort until forced to do so by environmental pressures	-1.211	-1.075	-0.476	-1.086	-0.878	-0.526	-1.343	-1.045	-1.035
Management fosters creative thinking and innovation in the company	1.367	1.453	1.143	1.617	1.366	1.385	1.566	1.500	1.263
Our top managers like to try new ways of doing things	1.289	1.340	1.127	1.543	1.366	1.231	1.505	1.455	1.333
Management spend adequate time planning change	0.889	0.887	0.540	0.901	0.683	0.628	1.051	0.864	0.596
If the company is performing well, change is still a priority	1.178	1.245	0.603	1.272	1.146	0.987	1.404	1.432	0.842
The organisation is working to a clear business plan	1.000	1.151	0.921	1.086	0.927	0.923	1.162	0.909	0.772
Management encourages everyone in the firm to come up with new ideas	1.156	1.264	0.841	1.321	1.122	1.154	1.333	1.318	1.175
The management team take time to think constructively/creatively about the future	1.156	1.226	1.095	1.481	1.268	1.282	1.384	1.205	1.105

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> All firms are included (see last 3 categories for each region in Figure 2).

<sup>c</sup> Colours indicate ability to reject null of no trend across innovation sub-group at ■ = 10%/ ■ = 5%/ ■ = 1% significance level.

<sup>d</sup> (1) = Major product innovation; (2) = No major product innovation; (3) = Not engaging in innovation related activities

either upwards or downwards across the sub-groups to see if we can reject this hypothesis at a high level of significance (1%), medium

significance (5%), or low significance (10%). In addition, we also test a different (null) hypothesis that there is no deviation from trend across the innovation sub-groups; this allows us to see if (in our case) one or more sub-groups report significantly different values to the other sub-group(s), but there is now no linear progression from low-to-high values, or from high-to-low values (i.e. there is no straight-line trend across the values reported). In the tables we report only the (null) hypothesis that was most strongly

rejected (if, as sometimes occurred, both hypotheses were rejected), using a colour scheme reported in the table footnotes.

Table 6 shows that only one of the five questions asked about the lifecycle of the product/service resulted in significant differences across the innovation sub-groups; firms in the Scottish and Northern Ireland Border Regions were most likely to agree that the firm needed to be kept stable and profitable at this stage in its lifecycle (rather than

## 5

questions were asked about the lifecycle of the product/service

<sup>8</sup> See the discussion of Table 3 for more details.

<sup>9</sup> if required, this can be done by the reader noting the following conversion linkages: (-2 to -1.55 = strongly disagree); (-1.54 to -0.55 = disagree); (-0.5 to 0.5 = neutral); (0.55 to 1.5 = agree); (1.55 to 2 = strongly agree).



## 3

## questions related to the strategic focus of the firm

expanded) if they were not involved in expenditure on innovation related activities; those with major product

innovations in the last three years were least likely to agree.

This was also true for firms in the Republic of Ireland, but the differences in the scores are too small across sub-groups to indicate there was a significant relationship between innovation and the answer to the question.

All three questions related to the strategic focus of the firm resulted in significantly different results across

the three innovation sub-categories. Those not involved in innovation related activities were more likely to agree that the company had a narrow range of products (although not in Northern Ireland firms); while those that had achieved a major innovation in the last 3 years were more inclined towards strongly agreeing that their company continually searches for new market opportunities. Note, all companies (irrespective of which innovation sub-group they belonged to) tended

**Table 7:** Culture and business improvement methods linked to and innovation related activities in SME firms in ICE survey by region <sup>a,b,c</sup>

Whether firm strongly agrees (coded 2) to strongly disagrees (coded -2) with statement:	Scotland			Northern Ireland			Republic of Ireland		
	(1) <sup>d</sup>	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
There is a strong team spirit at all levels of the organisation	1.200	1.245	1.143	1.494	1.268	1.192	1.485	1.500	1.088
The culture in this organisation promotes change	1.067	1.075	0.683	1.346	1.268	0.949	1.424	1.159	1.018
Two way communication happens at all levels of the organisation	1.089	1.075	0.857	1.407	1.195	1.103	1.394	1.318	1.228
The structure of the organisation facilitates change	1.056	0.981	0.937	1.370	1.220	1.090	1.343	1.318	1.053
Overall, employees have access to all the resources needed to get the job done	1.156	1.208	1.048	1.481	1.317	1.397	1.444	1.636	1.404
The organisation has a formal/informal TQ/CI programme	0.489	0.698	-0.206	0.074	0.195	-0.500	0.949	0.659	0.614
The TQ/CI programme has clear goals, objectives and measures of success	-0.589	-0.189	-0.873	-0.370	0.000	-0.538	0.283	0.045	-0.053
Successful TQ/CI problem solving teams are spread throughout the organisation	-0.678	-0.491	-1.000	-0.556	-0.512	-0.538	0.081	-0.114	-0.316
The programme is adequately resourced	-0.733	-0.415	-0.984	-0.444	-0.195	-0.705	0.131	0.182	-0.175
Greater than 50% of the workforce are involved in TQ/CI	-0.811	-0.321	-1.063	-0.407	-0.439	-0.705	-0.020	-0.091	-0.281
The TQ/CI programme is used to improve processes	-0.578	-0.151	-0.810	-0.259	0.049	-0.526	0.242	0.227	-0.053
A number of quality improvements have been achieved from the programme	-0.589	-0.075	-0.825	-0.222	0.146	-0.538	0.293	0.227	0.088

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> All firms are included (see last 3 categories for each region in Figure 2).

<sup>c</sup> Colours indicate ability to reject null of no trend across innovation sub-group at ■ = 10% / ■ = 5% / ■ = 1% significance level; (ii) reject null of no deviation from trend across innovation sub-group at ■ = 10% / ■ = 5% / ■ = 1% significance level.

<sup>d</sup> (1) = Major product innovation; (2) = No major product innovation; (3) = Not engaging in innovation related activities

towards agreeing or strongly agreeing with the statement that they continually searched for new market opportunities; however what Table 6 shows (backed-up by statistical testing) is that on average the strongest positive responses were given by innovating firms.

When asked to respond to the statement that “the organisation seldom makes adjustments of any sort until forced to do so by environmental pressures”, on average most firms tended to disagree, although firms with no involvement in innovation activities tended to bunch closer to a more neutral response to the question.

Thus overall, the strategic focus of firms not involved in innovation related activities was more towards having a narrow range of products and markets, to be less active in searching for new opportunities, and less likely to adjust when faced by changes in the environment in which they operated (such as technology shifts of ‘shocks’ to demand).

Turning to ‘leadership’, seven of the eight questions asked resulted in significantly different outcomes. Innovative firms were generally more likely to agree that management fostered creative thinking and innovation in the organisation; that they were more likely to try new ways of doing things (although this was only significant in Northern Ireland); they allowed for adequate time in planning change (although less so in Northern Ireland); and they took time to think constructively/creatively about the future (this is less obvious in Scotland). Innovative firms were also more likely to agree that if the

company is performing well, change is still a priority; while there was little difference across sub-groups in response to the statement that the organisation is working to a clear business plan (the exception being the Republic of Ireland where more positive answers were received for firms that had innovated). Lastly, only in Scotland was there any indication that innovative firms were significantly more likely to have their management encouraging everyone to come up with new ideas.

In summary, the results for ‘leadership’ suggest that there were important differences in the role and direction of managers in innovative firms, when compared to non-innovative firms where creativity, planning and the likelihood of change was less in evidence.

Table 7 begins with the results relating to statements about the ‘culture’ of the organisation. Five of the twelve questions asked resulted in significantly different outcomes. Innovative firms were generally more likely to agree that there was a strong team spirit at all levels of the organisation (although differences across innovation sub-groups were less evident in Scotland); that the culture of the organisation promoted change; and that the structure of the organisation facilitated change (although ‘structure’ – rather than ‘culture’ – was weaker, especially in Scotland).

When asked whether two-way communication happened at all levels in the organisation, only firms in Northern Ireland were different in terms of innovation sub-groups (those innovating were significantly more likely to agree than were non-innovators). And only in the

# 33%

of firms use continuous improvement as a business improvement method

# 27%

of firms surveyed have achieved ISO 9001

# 22%

of firms surveyed have achieved Total Quality Mark

Republic of Ireland was there a statistical difference with regard to the statement that “overall employees have access to all the resources needed to get the job done”; however, it was those firms that had engaged in innovation related activities, but not achieved a major product innovation, who were most likely to strongly agree with this statement.

With regard to business improvement methods (BIM), Figure 7 shows the percentage of firms in each region that used various BIM's (for over two years) with overall the most popular being Continuous

<sup>10</sup> Note, the percentage of firms with at least one of the BIM's was 57.8%, 50%, and 60% respectively, for Scotland, Northern Ireland and the Republic of Ireland Border Regions.

<sup>11</sup> Note, at this stage there is a need to be careful about drawing too strong a conclusion based on Figure 7, as there can be intervening factors (which are not ‘controlled for’ here) that might explain some of the patterns observed in the diagram. Multivariate statistical analysis is therefore needed to confirm the strength of any relationship between the extent to which firms engaged in innovation related activities and their use of BIM.

<sup>12</sup> Alternatively, it may be that such firms treat BIM in part as an alternative to introducing new products/services – i.e., to instead incrementally improve the quality of their existing goods and services.

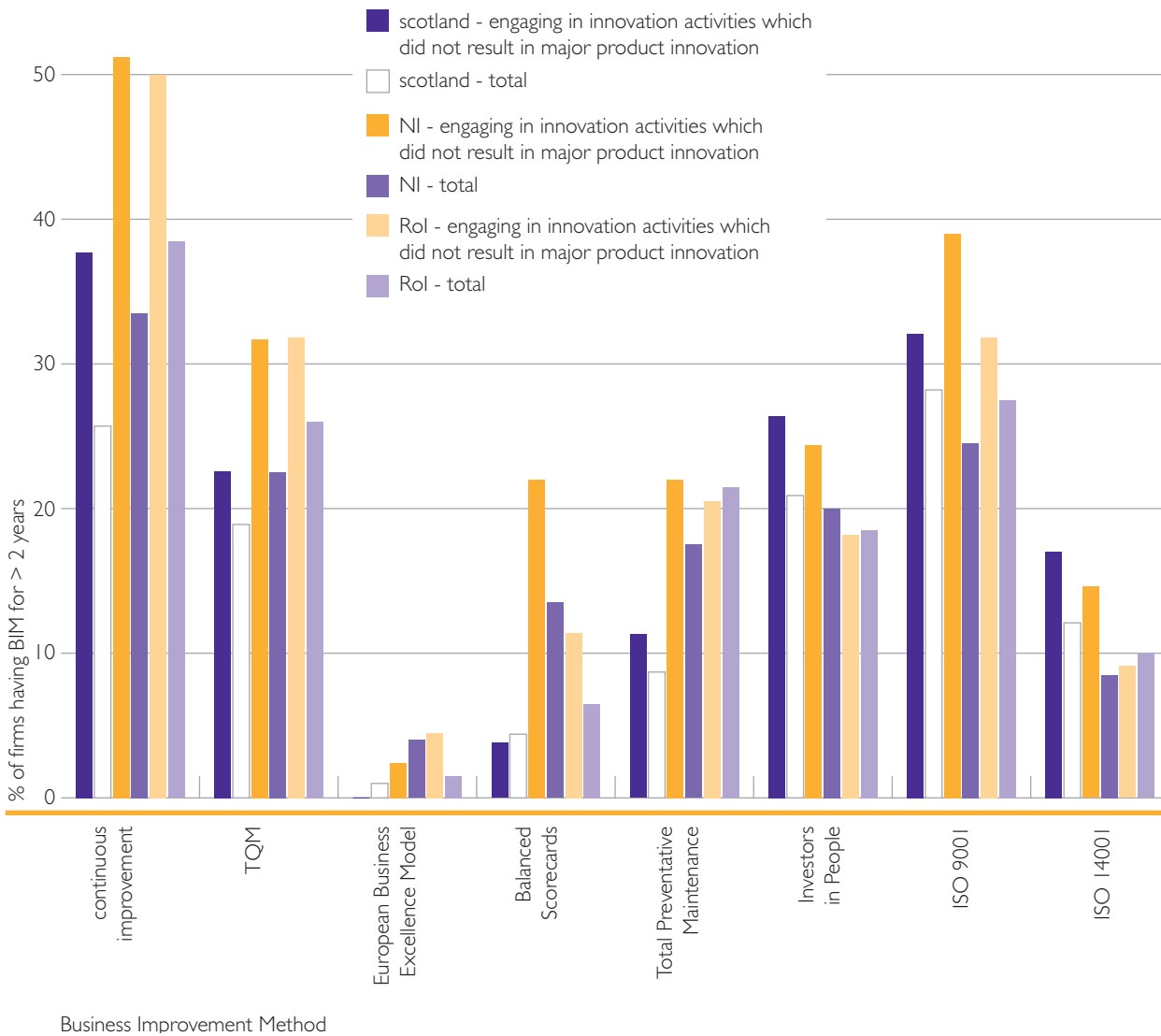
Improvement (some 33% of all firms using this, 39% in the Republic of Ireland, 33% in Northern Ireland and 26% in Scotland), followed by ISO9001 (overall 27% of firms had this quality mark), and Total Quality Management (overall 22% of firms had TQM)<sup>10</sup>. However, what stands out in Figure 7 (which is mostly confirmed below in discussing the

BIM results in Table 7) is the large percentage of firms with BIM that also engaged in innovation activities which did not result in a major product innovation in the last 3 years.

In the majority of cases, this sub-group made higher use of BIM than did those firms that innovated and

those not engaged in innovation related activities. This greater popularity of BIM in such firms may in part explain why they were less likely to have a major innovation, despite investing in innovation related resources<sup>11</sup>. That is, the time and resources that need to be committed to successfully implementing BIM may weaken the

**Figure 7:** Percentage of SME firms with Business Improvement Methods for 2 years of more in ICE survey by region <sup>a,b</sup>



<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> All firms are included.

**Table 8:** Knowledge acquisition and networks linked to and innovation related activities in SME firms in ICE survey by region <sup>a, b, c</sup>

Whether firm strongly agrees (coded 2) to strongly disagrees (coded -2) with statement:	Scotland			Northern Ireland			Republic of Ireland		
	(1) <sup>d</sup>	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
We conduct frequent market research to be aware of customers needs	0.744	0.038	0.175	0.852	0.561	0.218	0.606	0.614	0.193
Licensing is a method we often use to obtain information/knowledge of technology	-0.700	-1.189	-1.095	-0.790	-1.122	-1.154	-1.364	-1.455	-1.561
We have developed new products/services and/or processes in collaboration with other firms	0.311	-0.189	-0.778	-0.086	-0.293	-0.103	-0.030	-0.432	-0.491
We are well aware of the information/knowledge and technologies being developed by our competitors	0.622	0.736	0.127	0.926	0.341	0.628	0.768	0.432	0.439
We have become an information/knowledge or technology supplier to other firms in the sector	0.178	-0.736	-0.651	-0.198	-0.512	-0.564	-0.384	-0.773	-0.772
We usually go to outside public sector bodies (e.g. universities) to find out about fresh opportunities for introducing new products/services	0.044	-0.396	-0.238	0.037	-0.098	-0.244	0.030	-0.273	-0.333
Sufficient resources are allocated to support network activities	0.400	0.208	-0.159	0.086	0.171	-0.090	0.152	-0.114	0.088
The organisation uses a range of activities and mechanisms to initiate new relationships with others	0.467	0.189	-0.190	0.123	0.244	0.051	0.152	-0.136	-0.070
Network activities are systematically linked to organisation plans	0.011	-0.245	-0.222	-0.185	0.317	-0.397	-0.192	-0.273	-0.421

<sup>a</sup> The areas covered in each region are set out in footnote 1.

<sup>b</sup> All firms are included (see last 3 categories for each region in Figure 2).

<sup>c</sup> Colours indicate ability to (i) reject null of no trend across innovation sub-group at ■ =10%/ ■ =5%/ ■ =1% significance level; (ii) reject null of no deviation from trend across innovation sub-group at ■ =10%/ ■ =5%/ ■ =1% significance level.

<sup>d</sup> (1) = Major product innovation; (2) = No major product innovation; (3) = Not engaging in innovation related activities

ability of some firms, who are also investing in innovation activities, to achieve any major product innovations.<sup>12</sup>

Table 7 shows that those firms in Scotland and Northern Ireland engaging in innovation related activities that did not innovate were more likely to agree that the organisation had a TQ/CI programme.

Furthermore, such firms in Scotland (but not the other two regions)

stated that they had TQ/CI programmes with clear goals, objectives and measures of success; the programme was adequately resourced; greater than 50% of the workforce was involved; the programme was used to improve success; and a number of quality improvements had been achieved from the programme.

In contrast, firms in the Republic of Ireland were more likely to agree that they had a formal TQ/CI programme if they were innovative,

and these firms were also more likely to have successful TQ/CI problem solving teams spread throughout the organisation. In

# 3

number of innovation's related sub-groups analyzed in the survey



contrast, there was little relationship between effective TQ/CI programmes and innovation activities in Northern Ireland.

So while TQ/CI programmes seemed to be associated more with firms who unsuccessfully invested in innovation in Scotland (perhaps indicating TQ/CI 'got in the way'), firms in the Republic of Ireland believed that TQ/CI was more likely to be associated with successful innovation (although note that this does not directly match with the information firms gave on whether they had had a CI/TQM programme for 2 years of more as shown in Figure 7 – hence clearly more analysis is required before drawing any conclusive views on this matter).

Table 8 considers the relationship between knowledge acquisition and networks, and innovation related activities. Firms were presented with 6 statements which were related to how internally the organisation incorporated or used knowledge and information.

None of these resulted in statistically significant differences across the 3 innovation sub-groups being considered, which was unexpected. However, six of the seven statements relating to how information/knowledge outwith the firm was identified and employed did result in significant differences across the sub-groups.

Firms introducing major innovations in the last three years were more likely to agree that they conduct frequent market research to be aware of customers needs; they were less likely to disagree that they used licensing as a means to obtain information/knowledge of technology (not significant in the Rol firms); they were more likely to agree they had developed new products/services and/or processes

in collaboration with other firms (only significant in Scotland); they stated they were more aware of the information/knowledge and technologies being developed by their competitors; and they were more likely to agree that they had become an information/knowledge or technology supplier to other firms in their sector.

Innovative firms in the Republic of Ireland Border region were also more likely to agree that they went to outside public sector bodies to find fresh opportunities for introducing new products/services (innovative firms in the other two regions also were more likely to agree they did this, but the differences were not significantly different to other firms in the survey).

In short, innovative firms were more likely to source external knowledge through various (gate-keeping) methods, and consequently were more likely to have higher levels of absorptive capacity (i.e. the ability in internalise external knowledge), even though such firms did not systematically differ from others in terms of internal knowledge processes. Thus, external knowledge gathering seems to be more important in association with achieving successful innovation outcomes.

Lastly Table 8 shows that three of the four statements on networking resulted in significant differences across firms in the three innovation sub-groups. In Scotland, successful innovators were more likely to state they agreed that they had sufficient resources allocated to support network activities, and that the organisation uses a range of activities and mechanisms to initiate new relationships with others.

In Northern Ireland, firms were

# 3

3 out of 4 statements on networking highlighted significant differences across firms

# 6

6 questions were asked about how firms used knowledge internally

# 7

7 questions were asked about how knowledge outside the firm was obtained

more likely to agree that network activities were systematically linked to organisation plans if they had committed resources to innovation activities had not introduce a major new innovation.

28

on average, firms in the survey have been in operation for 28 years

30%

of firms surveyed compete on the basis of product design

45%

said commitment of resources had resulted in major product innovations in the last 3 years

#### 4. Summary and Conclusions

This ICE Benchmark Survey of 606 small-to-medium sized enterprises (SME's) provides a profile of the firms already being assisted by the Development Agencies operating in the Border Regions.

They are predominantly manufacturing, given that government agencies have traditionally concentrated aid on these types of firms.

They have also been in operation for a considerable period of time (on average 28 years across the sample of 606 firms); are mostly locally-owned; have average employment of around 50; sell around 14% of their output outside the British Isles; around 30% of firms

compete on the basis of product design, while nearly 28% compete on cost effectiveness.

When firms in the survey were asked if they were engaged in innovation related activities, and whether the commitment of such resources had resulted in any major product innovations in the last 3 years, just under 45% answered 'yes'; around 23% of firms had engaged in innovation related activities but had not innovated; and some 33% of all firms were not involved in innovation related activities. There were some differences across firms in the Border Regions, with generally Southern Irish firms being the most innovative overall and Northern Irish firms being the least.

Despite introducing new products/services, only a small percentage of sales/turnover was attributable to these innovations – 29% overall – while the number of years that the firm's most important current product/service had been available to customers was nearly 12 years. Overall, the low level of sales attributed to new products/services, and the considerable 'age' of the most important product/service, suggests that assisted firms in the survey were mostly dependent on sales from relatively more established products and services.

Even those firms that had innovated stated that were generally not committed to making their existing products and services obsolete by introducing new ones; i.e., they were not particularly committed to a process of continuous product development, but were rather more committed to their existing (relatively more obsolete) products/services.

The assisted firms in the survey indicated that they were 'one-step-ahead' of the local competition, but

overall the results suggest that firms in the ICE survey that were involved in product innovation were relatively risk-averse towards making a strong commitment to introducing new products and services. As to the 33% of firms that were not involved in innovation related activities, in the case of Scotland nearly 78% of non-innovating firms had not had any previous experience of innovation activities in the past 5 years; and only some 14% of these firms planned any definite engagement in the next 3 years.

In contrast, firms in the Republic were not only currently more likely to be involved in innovation, but the experience and commitment to innovation was higher for current non-innovators. For Scottish firms, there is little indication of why they do not engage in innovation; the only area where there was any positive response is where they agree that lack of finance for innovation is a problem. Irish firms (North and South) stated that along with a lack of finance, market risk and uncertainty was a problem. Thus in the Irish firms, not committing resources to innovation activities involved more demand- rather than supply-side issues.

In summary, our results point to a general lack of relevance for innovation related activities for those one-third of firms not currently engaged in such investment. If they were to become more profitable, and if they could see a greater likelihood that their customers would be prepared to pay more for more innovative products (and/or government are willing to offset the riskiness and uncertainty associated with innovating), then the results suggest that they might see some advantages in spending more on innovation related activities. However, it might also be that these firms simply lack the culture and

capabilities to innovate, which means they continue to sell relatively older products/services.

As to barriers to innovation, larger firms were more likely to invest in innovation related activities; so were firms that exported; as were those who believed that 'product design' was the most important factor in determining their competitiveness in the next 3-5 years. Family-owned firms were generally associated with lower levels of innovativeness. These are all characteristics that are well-established in academic studies as to what determines productivity differences across firms.

The ICE Benchmark Survey also asked respondents a series of question related to (i) where they were in the lifecycle of the product/service they sold; (ii) the strategic focus of the firm; (iii) leadership; (iv) culture; (iv) the use of Business Improvement Methods; (v) how internal and external knowledge was acquired and incorporated in the firm; and (vi) networks.

Starting with lifecycle effects, firms on average reported that they needed to be kept stable and profitable (rather than expanded) if they were not involved in expenditure on innovation related activities; those with major product innovations in the last three years were least likely to agree with the need for maintaining the status quo.

In terms of the strategic focus of firms not involved in innovation related activities, they were more likely to have a narrow range of products and markets, to be less active in searching for new opportunities, and less likely to adjust when faced by changes in the environment in which they operated (such as technology shifts of 'shocks' to demand).

The results for leadership showed that there were important differences in the role and direction of managers in innovative firms, when compared to non-innovative firms where creativity, planning and the likelihood of change was less in evidence.

In terms of the culture of the organisation, innovative firms were generally more likely to agree that there was a strong team spirit at all levels of the organisation; that the culture of the organisation promoted change; and that the structure of the organisation facilitated change.

With regard to business improvement methods (BIM), Continuous Improvement had been in use for at least two years in some 33% of firms, followed by 27% using ISO9001, and 22% having adopted Total Quality Management.

Overall, firms that had engaged in innovation related activities but without introducing a major new product/service made higher use of BIM than did those firms that innovated (and those not engaged in innovation related activities). This greater popularity of BIM in such firms suggests that the time and resources that need to be committed to successfully implementing BIM may weaken the ability of some firms, who are also investing in innovation activities, to achieve any major product innovations.

However, there were regional differences that need to be noted; while TQ/CI programmes seemed to be associated more with firms who unsuccessfully invested in innovation in Scotland (perhaps indicating TQ/CI 'got in the way'), firms in the Republic of Ireland believed that TQ/CI was more likely to be associated with successful

# 29%

of sales/turnover was attributable to introducing new products/services

# 78%

of non-innovating firms had not had any previous experience of innovation activities in the past 5 years

# 12

the number of years that the firm's most important current product/service had been available to customers

innovation, while in Northern Ireland there was a much weaker relationship between effective TQ/CI and innovation activities.

As to the relationship between internal and external knowledge acquisition and innovation related activities, innovative firms were more likely to source external knowledge through various (gate-keeping) methods, and consequently were more likely to have higher levels of absorptive capacity (i.e. the ability in internalise external knowledge), even though such firms did not systematically differ from others in terms of internal knowledge gathering processes. Thus, external knowledge gathering seems to be more important in association with achieving successful innovation outcomes.

86

firms in the West of Scotland involved in the ICE Survey involved in manufacturing

15,373

total employment of firms in the West of Scotland involved in the ICE Survey

Lastly on networking, the results did not support strong conclusions that could be applied to all three Border Regions; in Scotland, successful innovators were more likely to state they agreed that they had sufficient resources allocated to support network activities, and that the organisation uses a range of activities and mechanisms to initiate new relationships with others. In Northern Ireland, firms were more likely to agree that network activities were systematically linked to organisation plans if they had committed resources to innovation activities but had not introduced a major new innovation.

Thus, overall, no clear patterns on

the role of networking emerged at this stage of our analysis of the ICE Benchmark Survey.

A final point to note is that the analysis reported here is based on summarising the information available 'question-by-question', and this generally ignores linkages across variables. Thus, further (multivariate statistical) analysis is needed to explore further the nature of the relationships between variables, and ultimately issues such as what factors are most important in determining which firms innovate and which do not. This is the subject of on-going work and will be reported on in further briefing papers for the ICE project

## Appendix

**Table A:** Comparison of distribution of firms in West of Scotland: population and survey data

Industry	Scottish ABI <sup>a</sup>			ICE Survey <sup>b</sup>		
	Total Employment	No. of firms	% of firms	Total Employment	No. of firms	% of firms
Manufacturing	15,512	321	13.4	7,836	86	41.7
Construction	6,746	236	9.8	854	18	8.7
Wholesale & Retail trade; repairs	20,241	523	21.8	960	26	12.6
Hotels & Restaurants	10,217	347	14.4	342	13	6.3
Transport, Storage & Communication	6,207	180	7.5	1,857	5	2.4
Real Estate, Renting and Business Activities	11,893	360	15.0	964	18	8.7
Education & Health	8,952	207	8.6	595	11	5.3
Other service activities	5,450	173	7.2	630	17	8.3
All other industries	2,743	57	2.4	1,335	12	5.8
<b>Total</b>	<b>87,961</b>	<b>2,404</b>	<b>100.0</b>	<b>15,373</b>	<b>206</b>	<b>100.0</b>

<sup>a</sup> Data covers all firms in 2007 employing 10-250 (source: Annual Business Inquiry).

<sup>b</sup> Data covers firms surveyed for ICE project in November 2009.

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## References

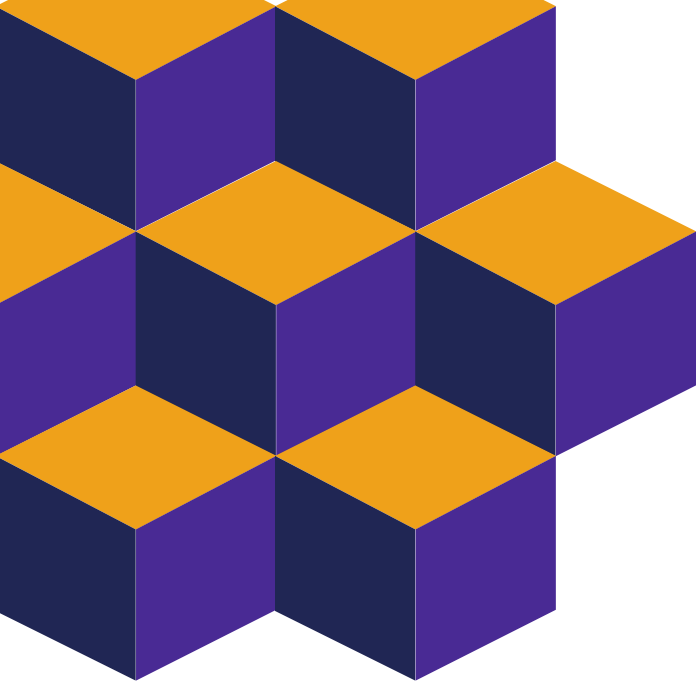
Harris, R.I.D. and Q.C. Li (2009) Internationalisation Evidence Review. Final Report. Report prepared for Scottish Enterprise (available at: <http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=351>)

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A copy of the survey questionnaire used is available at: <http://www.iceprogramme.com/research-and-publications>





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This project is part-financed by the European Union's European Regional Development Fund through the INTERREG IVA Cross-border Programme managed by the Special EU Programmes Body