Nesta...

FOREIGN DIRECT INVESTMENT AND UK SUPPLIERS

THE IMPACTS ON INNOVATION CAPABILITIES

A report prepared by PACEC
on behalf of Nesta

March 2013

ACKNOWLEDGEMENTS

The core PACEC team comprised Rod Spires (Project Manager) and Matt Rooke with Barry Moore.

The support team at PACEC included Nii Djan Tackey, Paul Ellis and Stephanie Wright. The interviews with businesses were carried out by PACEC's in-house survey research and analysis team.

We would like to thank the representatives of the businesses and organisations who participated in the survey research and other organisations that provided data. Without their co-operation the study would not have been possible.

The research, analysis, and conclusions are those of PACEC.

About Nesta

Nesta is the UK's innovation foundation. An independent charity, we help people and organisations bring great ideas to life. We do this by providing investments and grants and mobilising research, networks and skills.

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X1.1
In February 2012 Nesta appointed PACEC to assess the impact of foreign direct investment (FDI) on the innovation capabilities of their UK suppliers. The aim was to provide policy-relevant information on the effect of FDI on the levels of innovation in the supply chain; for example, improvements to R&D practices and skills for innovation. A key issue for policymakers is the innovation transmission mechanisms used by FDI and the responsiveness of the suppliers. A related aim of the research was to broadly benchmark the practices of UK-owned businesses against the impacts of FDI.

X1.2
The hypotheses and questions that Nesta was seeking to test were whether FDIs had any recognisable impacts on their suppliers and their innovation practices; and whether these were influenced by factors such as country of origin, size and innovation practices. A second issue was whether UK-owned businesses also had impacts, and the extent to which the FDI impacts were greater or not. Related to this was the question as to whether FDIs and UK-owned businesses had policies and mechanisms to influence activities of their suppliers.

X1.3
The background research on these issues was limited. One piece of research carried out by DTI considered the wider effects of FDI and the impacts on innovation amongst suppliers to some extent[1]. The specific aims of the project are to fill out the research, and to give policymakers an indication of the extent to which innovation improvements occur as a result of FDI, whether FDIs take the capacity of suppliers into account, under what circumstances innovation takes place, whether improvements are the result of actions by either the suppliers or the FDIs, and to what degree impacts differ between FDIs and UK-owned businesses.

X1.4
The nature, causes and sequence of FDI impacts on their suppliers is complex. They arise through a series of choices as FDIs select their suppliers and liaise and transact with them on their requirements, quality and delivery issues, and the adjustments that take place to ensure they can be met.

X1.5
Initial scoping discussions with FDIs and suppliers indicated that a range of criteria was used by FDIs to select their suppliers. These include efficiency/cost and the ability of suppliers to meet standards. Through the transactions with suppliers the impacts on innovation develop. These can be illustrated by impacts on the general innovation capabilities of suppliers, the R&D activities, technology capabilities, and the ultimate products that result. These impacts reflect an innovation process. To influence the practices of suppliers, FDIs potentially use a series of mechanisms as part of ongoing supplier development.

X1.6
In order to meet the aims of the project, new and targeted research was required. There has been an integrated research programme comprising a survey of a representative

sample of some 500 FDIs to the UK, a survey of 260 FDI suppliers, and case studies with 30 FDIs and their suppliers. These tasks were combined with a survey with a broadly matched sample of 250 UK-owned businesses (i.e. not FDIs) and 125 of their suppliers. The suppliers interviewed were predominantly UK-owned businesses.[2] A regression analysis to give some insights into the characteristics which influence the impacts was also carried out as part of the research.

X1.7
FDI makes an important contribution to the UK economy. Analysis of UKTI flows of FDIs to the UK shows in broad terms:

- Between 2001/2 and 2010/11 there were some 12,371 investments to the UK.
- The number of successful inward investments recorded rose every year from 709 in 2002/3 to a peak of 1,744 in 2008/9, before falling back to 1,434 in 2010/11.
- The regions with the largest number of investments made were London (28 per cent of the total) and the South East (14 per cent); however, due to the scale of investments, the regions with the largest number of jobs created or 'safeguarded' (i.e. existing jobs in acquired companies) were the West Midlands (13 per cent of the total) and the North West (12 per cent).
- The USA is the most common source of inward investment by far (35 per cent of all investments 2001/2 to 2010/11), but the number of investments from the USA has fallen sharply since 2008-9; this drop accounts for 76 per cent of the total fall in the number of investments from overseas.

X1.8
These figures show that the scale of FDI is significant, and a major source of revenue for the UK supply chain.

X1.9
The survey research shows that the FDI companies are more likely to have innovated in the past three years than their UK counterparts. Fifty-one per cent of FDI companies had introduced new products/services and 38 per cent new processes, compared with 25 per cent of UK companies having introduced products/services and 25 per cent new processes. The regression analysis shows that independently of other factors such as size and sector, FDI companies had 1.8 times higher odds[3] than UK companies of having innovated in one of the following ways: introducing a new product, service, or process, or registering new IP.

X2 The selection of suppliers

X2.1
The FDIs mainly locate in the UK to access the UK and European markets and to grow their businesses – but the innovation capability of suppliers and the innovation environment in the UK can also play a role.

X2.2
The general business capability of suppliers is important to the FDIs especially the extent to which suppliers are efficient and cost competitive while providing the levels of quality and reliability required.

X2.3
To make their selection of suppliers, the FDIs mainly look for their ability to manage innovation and collaborate with them. One in ten deliberately seeks R&D skills and practices and/or technological competence and capability, together with the ability to use technology effectively in products and services. The high-technology FDIs place more emphasis on these characteristics along with the retail and hospitality sectors that look for design capabilities for consumer goods, display and advertising material.

X2.4
Overall, the UK-owned businesses apply similar criteria to the FDIs when choosing suppliers. There are however differences between FDI businesses and UK-owned businesses in the high-tech sector: in this sector, UK businesses highlight R&D skills and practices and technological competence more than their FDI counterparts.

X3 The impact on the innovation practices of suppliers

X3.1
The main focus of the research was whether FDIs have a recognisable impact on the innovation practices of their suppliers and the nature of it. The research shows that FDIs have a significant impact across all stages of the innovation process, with some one in five citing impacts. The suppliers to FDIs, who were surveyed, were twice as likely to acknowledge the impact, which indicates their strength. FDI impacts were also greater than those cited by the UK-owned businesses and their suppliers.

X3.2
FDIs claim to have impacts on the innovation capabilities of suppliers especially their ability and willingness to collaborate and exchange knowledge and their innovation skills. Suppliers also adapt their skills for innovation in response to the FDIs, as well as their technological competence and capability (with the ability to test the feasibility of technology) and develop products and processes. The high-tech, USA, European, and larger FDI businesses usually had the greatest impact on their suppliers.

X3.3
Suppliers generally agreed with the views of the FDIs but thought the impacts and the adjustments they made were greater, especially their willingness to collaborate, exchange information, develop their R&D practices, use technology, and develop products. Twice as many suppliers cited these impacts compared to the FDIs claiming they were probably more aware of the adjustments as they had directly implemented them.

X3.4
A second question was whether UK-owned businesses had impacts on their suppliers and how these compared with the impacts of FDIs. Some one in ten UK-owned businesses claimed impacts (half the number of FDIs), compared to between a fifth and a quarter of their suppliers, i.e. almost three times the rate.

X3.5
The UK-owned businesses cited impacts on innovation management practices (especially the willingness to collaborate and exchange knowledge, and the development of innovation skills), R&D activities (mainly skills and practices), technology (the ability to develop and apply appropriate technologies), and the development of products and processes.

X3.6
The suppliers of the UK-owned businesses placed more weight on innovation capabilities (collaboration, skills and knowledge exchange), followed by technology impacts (competence and capabilities), the development of products and R&D skills and practices.

X3.7
The research showed that compared to the UK-owned businesses, the FDIs claimed greater impacts across all stages in the innovation process. Approximately twice as many FDIs reported impacts upon their suppliers as did UK businesses. The regression analysis confirmed this, suggesting that FDI companies had 1.8 times the odds of reporting impacts upon their suppliers, taking into account other influencing factors such as conducting R&D in the UK, innovation, collaboration, providing direct assistance to suppliers, and having an explicit strategy or policy for supplier engagement. The supplier views underpinned this finding, with FDI suppliers around 50 per cent more likely to acknowledge impacts (by FDIs), especially on product development and the joint collaborative and knowledge exchange activities.

X4 The mechanisms used to influence suppliers

X4.1
A key question is how the FDIs and UK-owned businesses stimulate, encourage and bring about adjustments in their suppliers, and what the differences were. Some one in ten FDIs had an explicit strategic policy, while around a quarter provided direct assistance or other methods; which indicated that they sought to influence suppliers. Direct assistance was through technical assistance primarily focusing on the technology and its application to a product, process or service. The main methods for transmitting impacts (for one in four FDIs) were through the contractual arrangements (which covered specifications and quality requirements), joint working on design issues, often linked to formal supplier reviews. The sheer value and scale of supplier purchases was the main mechanism for stimulating suppliers to adjust.

X4.2
The suppliers of FDIs agreed that for them the direct assistance was important to underpin their adjustments. However, the main stimulus was the value of actual and potential contracts, and the contractual tie up on specifications and quality. Some three in four cited these influences.

X4.3
Nine per cent of UK-owned business had an explicit policy to develop their suppliers' capabilities, and 11 per cent provided direct assistance – less than half the number of FDI businesses. These were similar in type to those used by FDIs, but reported by fewer respondents.

X4.4
The suppliers of UK-owned businesses highlighted the technical assistance, value of purchases and contractual tie ups. They were twice as likely to report these impacts as the UK-owned businesses which they supplied.

X4.5
The comparisons between the FDIs and the UK-owned businesses showed that the former were around as likely as the latter (10 per cent vs 9 per cent) to have a strategic

and explicit policy to influence suppliers. Twenty-five per cent of FDIs reported that they had provided direct assistance to increase the innovation capability or capacity of their suppliers, as against 11 per cent of UK-owned businesses. However, the regression analysis shows that foreign ownership is not directly the significant factor in this increased level of provision of assistance: it arises indirectly from a combination of other factors such as the FDI businesses' greater level of innovation in products, services and processes. The FDIs place more emphasis on technical assistance, supplier reviews and joint working on quality and design. The FDI suppliers confirmed the use of these mechanisms (especially the, contractual arrangements, supplier reviews, staff development, and joint working) and placed more weight on them, compared to the suppliers to UK businesses. However, both thought the scale of purchases had the greatest impact.

X4.6
Overall, the main barriers to suppliers, in terms of innovation and making adjustments, were the cost and availability of finance for innovation, and the risks associated with innovation. Suppliers to UK-owned businesses identified these barriers more than the FDI suppliers.

X5 The wider impacts on innovation

X5.1
FDIs can also have an impact on the wider innovation system through their liaison and interactions with other organisations. The main interactions and collaborations (for a fifth) were with customers, other businesses and plants/sites in their group of companies. One in ten said there was collaboration with universities and research institutes and slightly fewer engaged in business networks and with R&D/technology businesses and suppliers. One in six engaged with the government sector. The high-tech FDIs undertook more collaboration, along with FDIs from the USA, Europe and larger FDIs. The suppliers of FDIs carried out a similar degree of collaboration and were slightly more likely to engage with the universities and business networks, but less so with government bodies.

X5.2
UK-owned businesses had lower levels of engagement compared to the FDIs, and slightly less with the universities and government departments. The suppliers of UK-owned businesses collaborated with similar external organisations, but the degree of it was lower than for all the other types of business (i.e. UK-owned businesses, FDIs and their suppliers).

X6 Regression analysis

X6.1
A set of statistical models was built to use the survey data on FDI and UK firms to test the theory that foreign direct investment into a firm is a significant influence upon the innovation impacts of firms upon their suppliers, independent of other factors such as their industrial sector, the activities they carry out in the UK, their size and their age.

X6.2
The results show the following:

- FDI companies were more likely than indigenous companies to claim innovation impacts upon their suppliers.

- FDI companies were more likely than indigenous companies to have innovated in the past three years.
- Independently of other key characteristics such as strategies, policies, and levels of innovation, FDI companies were no more likely than indigenous companies to have provided direct innovation capability or capacity assistance to their suppliers.
- FDI companies were less likely than indigenous companies to have used innovation criteria in their selection of suppliers.

X6.3
In addition to the FDI or indigenous status of companies, the key drivers of innovation impacts are as follows:

- Provision of direct assistance to suppliers (various forms).
- Conducting R&D in the UK.
- Developing new processes (all impacts) or products/services (particularly for strong impacts) in the last three years.
- Supplier selection criteria: general business practices, innovation criteria, or technology criteria.
- Having an explicit strategy or policy to develop the innovation practices of suppliers.
- Introducing new products or services in the last three years.
- Collaboration with other organisations on innovation and technological issues.

X7 General conclusions

X7.1
It was possible to draw out the main conclusions from the research, and which also reflect the study aims.

a) Innovation improvements that take place amongst suppliers, and are required by FDIs

X7.2
Improvements made by the suppliers to their innovation practices in response to the FDIs are across the whole innovation process for around a quarter to a third. The main adjustments were the willingness to collaborate, exchange knowledge, and improvements to innovation skills. Suppliers also improve their technological competence and capabilities which ultimately contribute to the development of both products and processes.

X7.3
These adjustments reflect the criteria used by FDIs to select their suppliers where innovation is concerned. While the focus is on general business capabilities such as efficiency, cost-effectiveness and quality, they also look for the ability of suppliers to manage the innovation process and collaborate with them as well as having R&D skills and technology competences.

b) The innovation capacity of suppliers and the location decisions of FDIs

X7.4
The vast majority of FDIs make a strategic decision to locate in the UK to take advantage of both UK and EU markets to help meet their growth ambitions. Around one in eight also take account of the innovation capabilities of suppliers in the UK as well as the innovation culture and practices amongst other organisations (including the universities and research bodies). This feature is ranked fourth as an influence on location along with the labour and skills in the UK workforce and is more important than, for example, the transport infrastructure and general government policies – although these are important for a small but significant proportion of FDIs.

c) The criteria FDIs use to select suppliers and the role of innovation criteria

X7.5
The main focus is on the cost-effectiveness and efficiency of suppliers and their ability to meet the standards and quality required by FDIs. FDIs also look for the ability of suppliers to manage the innovation process and collaborate with them as well as R&D skills and technology competences.

d) The circumstances in which supplier innovation improvements take place and the intentional actions by FDIs and suppliers

X7.6
At one level the suppliers make adjustments to their innovation practices as they seek to meet the selection criteria of the FDIs i.e., the willingness to collaborate, manage the innovation process and show they are competent in the relevant technology areas and contribute R&D skills that lead to product/process improvements. They also need to satisfy the requirements of the FDIs in terms of efficiency, costs, quality and standards.

X7.7
A key driver cited by most suppliers and FDIs which stimulates change and adjustment is the monetary value of actual and potential contracts linked to the contractual tie up on the specification and quality of outputs for FDIs.

X7.8
Other important factors that stimulate change are the policies of the FDIs to encourage this. While just one in ten had an explicit strategic policy, half provided direct assistance to their suppliers. This mainly involved technical assistance focusing primarily on technology issues and its adaptation for products and processes. The other main methods used by FDIs (apart from the contractual arrangements) were joint working and collaboration on innovation and design issues, linked to supplier reviews.

e) The differences between FDIs and UK-owned businesses

X7.9
The FDIs were twice as likely as the UK-owned businesses to claim impacts on the innovative activities of their suppliers (for all stages of the innovation process). The main differences were the higher impacts of FDIs on the innovation management of their suppliers (and their willingness to collaborate), the positive changes to R&D skills and practices, the ability of suppliers to develop and apply technologies, and the positive impacts on products, services and processes.

X7.10
The suppliers of FDIs were generally twice as likely to acknowledge the impacts of the FDIs compared to those supplying UK-owned businesses. The main differences were the impacts of FDIs on innovation management practices, collaboration and knowledge exchange, the adjustments to R&D practices, the development and application of technologies and the ultimate improvements to products and processes.

X7.11
Overall the impact of FDIs on suppliers was greater than the impact of UK-owned businesses. The above conclusions have some key implications for policymakers in seeking to encourage adjustments amongst suppliers both to help attract FDIs to the UK and helping to ensure they remain and improve their competitiveness. Supplier readiness is an important issue where FDI mobility is declining, and the number of projects was falling in the UK between 2008 and 2011.[4] However, there were barriers to innovation, concerned with the availability and cost of finance and the risk associated with innovation where the pay-off was uncertain. Some one in five suppliers of FDIs cited the costs and availability of finance, as did one in six suppliers to UK-owned businesses.

1 INTRODUCTION AND AIMS

1.1 Introduction and aims

1.1.1

In February 2012 Nesta appointed PACEC to assess the impact of foreign direct investment (FDI) through businesses investing in the UK on the innovation capabilities of their UK suppliers. The aim was to provide policy-relevant information, and the effect of FDI on the tangible and intangible levels of innovation in the supply chain; for example, improvements to R&D practices and skills for innovation, technology solutions, products and services of a higher quality than would normally be the case. A key issue for policymakers is the innovation transmission mechanisms used by FDI and the responsiveness of the suppliers. A related aim of the research was to benchmark the practices of UK-owned businesses against the impacts of FDI.

1.1.2

The main hypotheses and questions that Nesta was seeking to test were:

a. Whether the FDIs had recognisable impacts on the innovation practices of their suppliers and on their innovation practices, R&D activities, technology, and the development of products and services;

b. Whether UK-owned businesses also have an impact on the innovation practices of their suppliers;

c. Whether the FDI impacts on their suppliers were greater than the impacts of UK-owned businesses;

d. The extent to which the FDI impacts were influenced by factors such as the country of origin, size of FDI, and innovation practices;

e. The extent to which FDIs had policies and mechanisms to influence the innovation activities of suppliers.

1.1.3

The background to this research is that a large literature exists examining the costs and benefits of FDI for a host economy looking at effects on variables such as employment growth, productivity growth, competition etc. One area that has not been extensively researched is the effect of FDI on the levels of innovation in the supply chain. One piece of research carried out by DTI considered the wider effects of FDI and the impacts on innovation amongst suppliers to some extent.[5] Potentially exposure to inward investors makes it more likely that indigenous suppliers become more innovative than they would otherwise be. These benefits are often less widely understood compared to the more overt gains to the host economy in the form of employment, taxes and exports; however, they may have longer-term gains that could be at least equal to the more easily measured employment and income effects.

1.1.4
The specific aims of the research are:

- To give policymakers an indication of the extent to which innovation improvements take place in suppliers, and are required by FDIs, as a result of FDI so that any potential incentives can be considered.
- To identify if the innovation capacity of indigenous suppliers to make innovation improvements is taken into account by FDIs when making their decision on where to locate.
- To identify the criteria FDIs use to choose their suppliers and the role of innovation criteria.
- To identify the circumstances in which innovation adjustments take place, and what the mechanisms are; which may have implications for the priority targeting of potential inward investors.
- To assess the extent to which these improvements and adjustments are the result of intentional actions by either the FDIs or the suppliers.
- To examine the extent to which all of the above differ between FDIs and UK-owned businesses and their respective suppliers.

1.1.5
These issues are potentially important to policymakers both in terms of attracting FDI to the UK and developing the supply chain to help ensure that suppliers are better placed to meet the requirements of FDIs. The latter has implications for aftercare following the initial FDI investment, and to encourage further investment.

1.2 Innovation impacts on suppliers – some key issues

1.2.1
The nature, causes and sequence of FDI impacts on their suppliers is complex. They arise through a series of choices as FDIs select their suppliers and liaise and transact with them on specifications, quality and delivery requirements, and the adjustments that take place to ensure they can be met.

1.2.2
Initial scoping discussions with FDIs and suppliers indicated that there were a series of steps as part of a process which were sequential, overlapping and iterative as the buyer/supplier relationships developed. They have been used in the research to test the hypotheses, answer the questions, and develop a storyline or narrative to analyse and characterise the impacts.

a. The FDIs select their suppliers based on criteria reflecting their requirements. These may include efficiency/cost and the ability to meet standards. The initial scoping activity suggested that FDIs were to some extent attracted to the UK because of the innovation culture and practices. However, they were seeking to limit the number of their suppliers in part to reduce the overhead management cost and to achieve some economies of scale by placing larger orders with fewer suppliers.

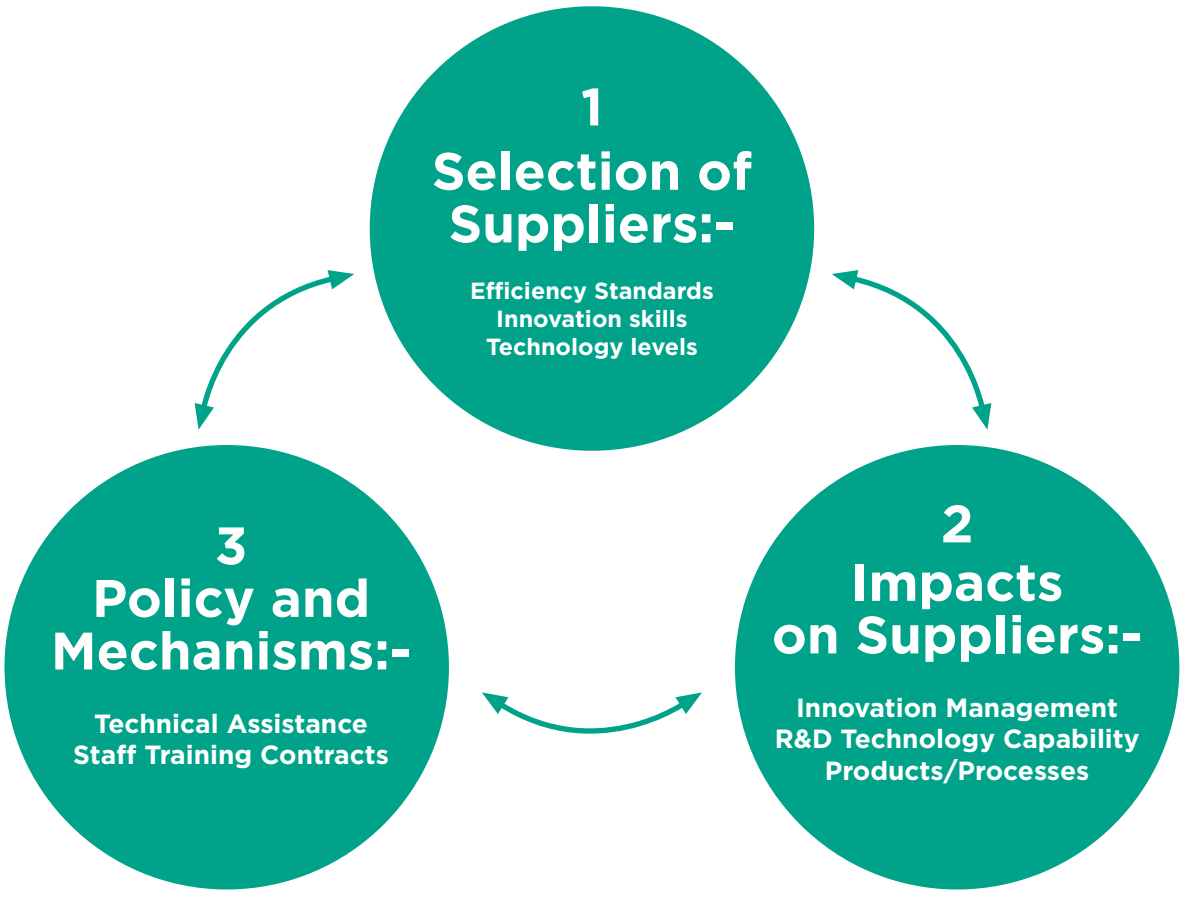
b. Through the transactions with suppliers the impacts on innovation develop. These can be illustrated by impacts on the general innovation capabilities of suppliers (such as the management of the innovation process and willingness to collaborate), the R&D activities (including skills and practices), the impacts on the technology capabilities of suppliers (such as their ability to recognise and use technology) and the ultimate impact on the development of IP, products and services.

   These impacts reflect an innovation process that originates with basic research and development, and runs through to the testing of technology applications and prototyping, to products, services and processes and their exploitation and commercialisation.

c. To influence the practices of suppliers, FDIs potentially use a series of mechanisms from the outset and as part of ongoing supplier development. FDIs can have an explicit strategy and/or policies and activities from providing technical assistance and training to more formal contractual arrangements and supplier reviews.

1.2.3
This is not seen as a linear process for all the FDIs and their suppliers. Transactions and joint working cut across these stages. They are used to illustrate the innovation process and structure the research findings.

1.2.4
The development of the relationships with suppliers and the interactions are shown in Figure 1.1 below.



1.2.5
These themes are used to explore the impacts, the storyline and narrative below.

1.3 The research methodology

1.3.1
In order to meet the aims of the project there has been an integrated and targeted research programme, comprising the following tasks:

a. The inception meeting. This defined the project aims and insights into the research, the key issues and working definitions. For example, the characteristics of FDI (modes of entry, sectors, country of origin and ownership), the definition of innovation, the nature of transmission mechanisms in terms of FDI and supplier innovation practices. The overall methodology was also agreed in terms of the scale of the survey research and case studies with FDI and UK-owned businesses and their suppliers and the sampling and data analysis issues.

b. A literature review. This focused on research with FDIs and their impacts on suppliers in terms of innovation and examples of survey research which could help to guide the approach to working with FDIs. However, as noted above, the research available focused on other types of FDI impact and was not focused on the supply chain and innovation.

c. A survey of FDI. Some 500 interviews were carried out with a representative sample of FDIs to the UK over the past 30 years or so. Companies were selected from the Experian business database based on an analysis of the stock of FDIs and data provided by UKTI over the past ten years on inward investment trends to the UK. The variables included industrial sectors, country of origin, mode of entry (e.g., new plant or merger/acquisition), destination by region to the UK, year, and size of the inward investors. The interviews were primarily held with those responsible for procurement, research and development, and design and technology issues, in the medium to larger businesses. In the smaller to medium firms, the interviews were with the MD, CEO, or the plant manager.

d. A survey of businesses that supplied FDI. Some 260 interviews were held with suppliers based on contact information provided by FDIs along with guidance on their suppliers by specific sectors and locations. FDIs were asked to identify a reasonably representative sample of their suppliers. A representative group of FDIs was used to match the population. Quotas were set based on the characteristics of suppliers provided by FDIs, e.g. suppliers of components, R&D, materials, business services, and logistics suppliers. The approach sought to ensure that the FDIs did not suggest the most innovative suppliers, or those where they thought the impact was greater.

e. Case studies of FDIs. Thirty case studies were carried out with FDIs and a typical supplier, where possible, to provide more detailed information on the characteristics of impacts and the inter-relationships. These interviews were qualitative. The sample reflected a cross-section of FDIs and their suppliers and was influenced by those who agreed to follow-up interviews to the main survey above.

f. A survey of UK-owned businesses. The purpose of this was to allow the impact of FDI businesses to be compared with UK-owned businesses. Some 270 businesses were interviewed with a sample that broadly matched the characteristics of FDI businesses above. Key variables were sector, size, age, and location in the UK.

g. A survey of businesses that supplied UK-owned businesses. The purpose of this element of the research was to allow the impact on these suppliers to be compared with the impact that FDI businesses have on their suppliers. Some 170 businesses were interviewed. The contact information was provided by UK-owned businesses and a matched sample drawn in from the Experian business database.

1.3.2
To permit the surveys to be analysed a series of databases were set up for SPSS. The data was ex-post weighted at the analysis stage to ensure that the characteristics of FDI businesses reflected the known characteristics of inward investors to the UK-based on the Experian and UKTI databases. The weighting also allowed FDI and UK-owned businesses and their suppliers to be matched for the comparative analysis.

1.3.3
The results of the surveys and analysis are presented below in tables with tests for significance, charts, and diagrams. The results need to be qualified in that some suppliers of FDIs were not interviewed although suppliers were sought for a representative group of FDIs. Also the characteristics of the FDI and UK-owned businesses while similar, are not exactly the same.

1.4 The structure of the report

1.4.1
Following this introduction, Chapter 2 outlines the FDI trends to the UK. Chapter 3 sets out the characteristics of businesses surveyed. The following chapters then examine the potential impacts on the stages of innovation shown in section 1.2 above. Chapter 4 examines how suppliers are selected and the influence their innovation practices play. Chapter 5 sets out the impact of FDI and UK-owned businesses on the innovation activities of their suppliers. Chapter 6 characterises the mechanisms that FDI and UK-owned businesses use to influence and assist the innovation practices amongst their suppliers. Chapter 7 is a statistical analysis of the key factors influencing innovation impacts upon suppliers. Chapter 8 examines the interaction with the wider innovation system which influences innovation activity, and the final chapter (Chapter 9) draws out the main conclusions and some of the key points reflecting the research aims which may have implications for policy.

2 INWARD INVESTMENT INTO THE UK

2.1.1
Data was provided by UKTI on successful inward investments to the UK, covering the ten financial years 2001/2 to 2010/11. This database included the country of origin of investments, the numbers of jobs created and 'safeguarded', and the region and mechanism of inward investment.

2.1.2
The 'safeguarded' jobs are existing jobs continuing to be provided by an acquired company. Not all the jobs would have been in danger of loss if the investment had not been made, and in this chapter they are referred to as 'existing' jobs to make this distinction.

2.2 The summary results

2.2.1
Panel 2.1 (below) shows the nature of FDI and trends in the UK between 2002/3 to 2010/11.

Panel 2.1 The summary of results

The key points from the analysis of UKTI's inward investment database are as follows:

- The number of successful inward investments recorded rose every year from 709 in 2002/3 to a peak of 1,744 in 2008/9, before falling to 1,434 in 2010/11.
- The ten years of investment 2001/2 to 2010/11 have been responsible for 379,597 new jobs and 406,108 'safeguarded' existing jobs. Over 94,000 jobs were created or safeguarded in each of 2009/10 and 2010/11.
- The regions with the largest number of investments made were London (28 per cent of the total) and the South East (14 per cent); however, due to the scale of investments, the regions with the largest number of jobs created or safeguarded were the West Midlands (13 per cent of the total) and the North West (12 per cent).
- The number of acquisitions made per year has fallen from 484 in 2005/6 to just 158 in 2010/11. The number of new investments has fallen less rapidly (from 779 in 2008/9 to 644 in 2010/11, and the number of expansions was higher in 2009/10 (479) and 2010/11 (477) than in any previous years.
- The USA is the most common source of inward investment by far (35 per cent of all investments 2001/2 to 2010/11), but the number of investments from the USA has fallen by 235, or 38 per cent, sharply since 2008-9; this drop accounts for 76 per cent of the total drop in the number of investments from overseas.

2.2.2
There were 709 successful investments recorded by UKTI in the year 2002/3, slightly lower than the previous year's total of 764. The total number of successful investments then rose every year until a peak of 1,744 in 2008/9, following which it fell back to 1,434 in 2010/11. The total number of jobs created and safeguarded by these investments followed a broadly similar growth pattern, but following a sharp fall from 103,539 in 2007/8 to 78,540 in 2008/9 appears to have recovered to around 94-95,000 jobs per year in 2009/10 and 2010/11. The full breakdown of investments, new jobs, and safeguarded jobs per year over the ten-year period is shown in Table 2.1 below.

Table 2.1 Investments, new jobs, and safeguarded jobs, 2001/2 to 2010/11

Year	UKTI data			
	Investments	New Jobs	Existing Jobs	Total Gross Jobs
2001-2	764	34,087	23,801	57,888
2002-3	709	34,396	19,915	54,311
2003-4	811	25,463	33,754	59,217
2004-5	1,066	39,592	35,451	75,043
2005-6	1,220	34,077	55,789	89,866
2006-7	1,431	36,526	41,831	78,357
2007-8	1,573	45,051	58,488	103,539
2008-9	1,744	35,111	43,429	78,540
2009-10	1,619	53,358	40,988	94,346
2010-11	1,434	41,936	52,662	94,598
Grand Total	*12,371*	*379,597*	*406,108*	*785,705*

Source: UKTI, PACEC

2.2.3

The breakdown by UK region of the investments made over the ten years 2001/2 to 2010/11, and the jobs created and safeguarded, are set out in Table 2.2 below. The largest absolute number of investments over the ten-year period was made in London, where 3,465 investments were recorded (28 per cent of the total). These investments in London were accountable for 56,087 new jobs and 34,235 safeguarded jobs, 90,322 jobs in total. The West Midlands and North West regions had many fewer investments than London in absolute terms (855 and 1,178 respectively), but the average size of these investments in terms of their employment impact was considerably greater; as a result, the biggest employment impacts of foreign direct investment were recorded in the West Midlands (104,957 total jobs) and the North West (97,822)

Table 2.2 Total investments, new jobs, and existing jobs, 2001/2 to 2010/11, by region of investment

Region	UKTI data			
	Investments	New Jobs	Existing Jobs	Total Gross Jobs
UK-wide	22	5,972	32,670	38,642
East Midlands	643	19,335	23,015	42,350
East of England	822	25,637	21,097	46,734
London	3,465	56,087	34,235	90,322
North East	620	28,714	27,654	56,368
North West	1,178	46,680	51,142	97,822
Northern Ireland	355	24,663	13,424	38,087
Scotland	747	33,487	21,352	54,839
South East	1,748	36,631	35,394	72,025
South West	577	17,952	27,761	45,713
Wales	593	32,926	24,775	57,701
West Midlands	855	31,817	73,140	104,957
Yorkshire And The Humber	746	19,696	20,449	40,145
Grand Total	*12,371*	*379,597*	*406,108*	*785,705*

Source: UKTI, PACEC

2.2.4

The regions of the United Kingdom vary greatly in their levels of employment, from 4.4 million in London (in 2011) to just 768,000 in Northern Ireland. As a result, it is not surprising that London has a greater number of gross jobs provided by inward investment (90,322) than Northern Ireland (38,087). To give context to the gross job figures above, Table 2.3 compares the total gross job figures from 2001/2-2010/11 with total employment in 2011. **Note that this table is for contextual comparison only** – the data is not sufficient to calculate the percentage of current jobs which could be attributed to inward investment, as it is not known how many of the existing 'safeguarded' jobs would have been retained in the absence of investment, nor how many of the jobs have been subsequently lost. The only purpose of the table is to indicate that the impact of inward investment does vary from region to region, relative to the intrinsic size of each region. It can be seen that inward investment appears to be more significant to employment levels in the North East, Northern Ireland, Wales, and the West Midlands than in the rest of the UK.

Table 2.3 Total investments, new jobs, and existing jobs, 2001/2 to 2010/11, by region of investment

Region	UKTI data		
	Total Gross Jobs 2001/2-2010/11	Total employment 2011	Total Gross Jobs as percentage of total employment
UK-wide	38,642	28,533,000	0.1%
East Midlands	42,350	1,988,000	2.1%
East of England	46,734	2,515,000	1.9%
London	90,322	4,433,000	2.0%
North East	56,368	1,039,000	5.4%
North West	97,822	3,081,000	3.2%
Northern Ireland	38,087	768,000	5.0%
Scotland	54,839	2,456,000	2.2%
South East	72,025	3,917,000	1.8%
South West	45,713	2,400,000	1.9%
Wales	57,701	1,261,000	4.6%
West Midlands	104,957	2,403,000	4.4%
Yorkshire and The Humber	40,145	2,273,000	1.8%
Grand Total	*785,705*	*28,533,000*	*2.8%*

Source: UKTI, PACEC, ONS

2.2.5

Over the ten-year period 2001/2 to 2010/11, the most common classes of investment were new investments (5,323), expansions (3,362), and acquisitions (2,905). As has already been set out, the total number of investments peaked in 2008/9 and has fallen off somewhat since that time. However, the three main types of investment set out in Table 2.4 below have responded differently since the 2008/9 peak. The number of expansions has continued to increase since the overall peak, from 408 in 2008/9 to 479 in 2009/10 and 477 in 2010/11. The number of new investments has fallen somewhat, from 779 in 2008/9 and 772 in 2009/10 to 644 in 2010/11. The number of acquisitions, in contrast, appears to have reached a peak in 2006/7 at 484, had already begun to decline gradually to 447 by 2008/9, and then fell by a further 65 per cent to 158 in 2010/11. Broadly, it is this decline in acquisitions which is most accountable for the overall drop in investments.

Table 2.4 Investments by year and type

Year	Type				
	Acquisition	Expansion	New Investment	Other	Grand Total
2001-2	220	222	302	20	764
2002-3	147	234	314	14	709
2003-4	171	285	339	16	811
2004-5	231	278	494	63	1,066
2005-6	366	318	490	46	1,220
2006-7	484	280	571	96	1,431
2007-8	471	381	618	103	1,573
2008-9	447	408	779	110	1,744
2009-10	210	479	772	158	1,619
2010-11	158	477	644	155	1,434
Grand Total	*2,905*	*3,362*	*5,323*	*781*	*12,371*

Source: UKTI, PACEC

2.2.6
Table 2.5 sets out a list of the countries which have made the most investments in the UK over the past ten years, and in the most recent full year 2010/11. The most common investor by far is the United States of America, which made 4,306 investments over the ten-year period 2001/2 to 2010/11, or 35 per cent of the global total. The next most common foreign direct investor nations over the last ten years have been Japan (777 investments), France (717), Germany (702), and Canada (684). Investment from India has grown rapidly in recent years, as can be seen from the fact that it lies sixth in the table of total investments over the ten-year period but third for the year 2010-11, with 97 successful investments recorded in that year. Australia, China, Italy, and Spain are similarly more highly-ranked in the list of investments in 2010/11 than they are in the ten-year list.

Table 2.5 Investments by selected countries

	Number of investments	
	2010-11	Grand Total
United States	388	4,306
Japan	105	777
France	69	717
Germany	71	702
Canada	68	684

India	97	617
Australia	53	495
China	59	390
Ireland	46	389
Sweden	30	303
Netherlands	38	300
Italy	53	295
Switzerland	45	248
Spain	56	217
All countries	*1,434*	*12,371*

Source: UKTI, PACEC

2.2.7

Table 2.6 illustrates the growth trend of investments from the USA compared to the rest of the world. The total number of successful investments in the UK peaked at 1,744 in 2008/9 and since then has fallen by 310, to 1,434 in 2010/11. Investments made by companies from the USA also peaked in 2008/9 at 621, and have since fallen by 235, to 388. The fall in investment from the USA is remarkable in that it amounts to a decrease of 38 per cent in just two years, and also in that it accounts for 76 per cent of the total drop in investment.

Table 2.6 Investments by year and source (USA vs world)

Year	Type		
	USA	Rest of world	Grand Total
2001-2	288	476	764
2002-3	283	426	709
2003-4	314	497	811
2004-5	464	602	1,066
2005-6	446	774	1,220
2006-7	540	891	1,431
2007-8	478	1,095	1,573
2008-9	621	1,123	1,744
2009-10	484	1,135	1,619
2010-11	388	1,046	1,434
Grand Total	*4,306*	*8,065*	*12,371*

Source: UKTI, PACEC

3 LOCATION IN THE UK AND BUSINESSES' CHARACTERISTICS

3.1 Introduction

3.1.1
In total, some 1,100 businesses participated in the surveys comprising FDIs, UK-owned businesses, and their suppliers. There were some 30 case studies of FDIs and typical suppliers. This chapter describes why FDI businesses choose to locate in the UK, and their characteristics. These help to inform the interpretation of the innovation impacts on suppliers shown in the chapters that follow. This chapter deals with the business sectors and activities, age, the size of businesses, and innovation activities. For FDIs it also covers country of origin, the form of inward investment, the date of investment in the UK.

3.2 The summary results

3.2.1
The main results from the surveys on the location of FDI to the UK and characteristics of businesses are shown in Panel 3.1.

Panel 3.2 The summary of results

For FDIs the main reasons for locating in the UK were:–

- Access to markets (64 per cent) and EU markets (22 per cent)
- Growth and expansion (53 per cent)
- An acquisition or merger (28 per cent)
- Labour skills in the UK (13 per cent)
- The technology, R&D, and innovation capabilities of businesses or suppliers and other organisations (12 per cent)

The main sectors were financial/business services, retail/hospitality (a quarter each), conventional manufacturing and high-tech (a fifth each), and infrastructure (one in ten). A third had located in the UK since 2001. The median size in employment was 48. Half had introduced significantly improved products/services to the market in the last three years and some two in five new processes.

The main activities of UK-owned businesses comprised conventional manufacturing, financial/business services, retail/hospitality (a quarter each), high-tech (one in ten), and infrastructure (one in six). Half started up since 2001. The median size was 20 employees. A quarter had either introduced new products to the market in the past three years, or new processes.

The FDI suppliers for the most part started in business since the mid 1970s. Some 57 per cent had introduced new products/services, and 39 per cent processes, to the market in the last three years. **This is a substantially higher baseline level of innovation than the UK-owned businesses,** a quarter of which had introduced new products or services to the market within the last three years, and a quarter of which had introduced new processes over the same period.

The suppliers to UK-owned businesses for the most part had started in business since 1990. A quarter had introduced new products and one in seven new processes to the market in the last three years.

3.3 The FDIs

3.3.1

The FDIs comprised five main sectors, with financial and business services, and retail and hospitality representing around a quarter, conventional manufacturing and high-technology each representing about a fifth of businesses, and infrastructure one in ten. The definitions of the sectors, in summary, are:

- **Conventional manufacturing.** For example, food processing, metal products, clothing, furniture, packaging, machinery, and paper.
- **Finance and business services.** For example, banking, insurance, pensions, accountancy, and real estate.
- **High-technology.** For example, pharmaceuticals, R&D, biosciences, medical instruments, computer hardware, telecoms.
- **Retail and leisure.** For example, the sale of consumer goods, clothing, furniture and household appliances, hotels and restaurants, entertainment and broadcasting.
- **Infrastructure.** For example, transport and logistics, storage, utilities, and construction.

3.3.2

The analysis below reflects the sectors and characteristics.

3.4 Reasons for locating to the UK

3.4.1

The factors which influence companies are set out under their strategy, business operations, and government policy. In terms of strategy, the main reasons for investing in the UK were access to markets (64 per cent) linked to growth and expansion plans (53 per cent). The key markets were Europe for non-European FDIs (i.e., 22 per cent of all businesses) and the UK market for FDIs that originated elsewhere in Europe. The conventional manufacturing, retail, high-tech and infrastructure sectors were slightly more keen to access markets, compared to the financial services sector. Firms in the conventional manufacturing, infrastructure and financial services sectors sought growth and expansion. With regard to business operation, indigenous labour and skills were important for almost one in six of businesses, and 14 per cent in high-tech and the conventional manufacturing sectors. The innovation capabilities of suppliers, their level of technology and R&D practices were an influence for 12 per cent of businesses, especially with higher proportions in the high-tech sector (almost one in five). See Table 3.1.

Table 3.1 Factors that influenced FDIs to invest in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Strategy						
An acquisition/ merger	28	19	38	27	23	36
Growth/expansion	53	63	56	48	41	62
Access to markets	64	68	56	67	67	65
Access EU markets	22	25	22	23	16	26
Business operation						
Labour/ skills in the UK	13	14	9	14	8	12
Technology, R&D, capabilities of innovation businesses as suppliers, and the innovative culture and practices (businesses, universities, research organisations)	12	8	2	18	11	5
The transport network /infrastructure	4	5	1	5	5	4
Efficiency gains/ cost reductions	5	3	2	4	9	3
The UK residential environment	4	4	1	3	3	4
Government policy						
The Government's policy	5	4	3	6	3	5

Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q8A)

3.4.2
The more recent investors showed the same pattern of factors with some greater emphasis on the need to access markets in the EU.

3.4.3

The primary broad activities in the UK were a combination of manufacturing/assembly (25 per cent), sales and marketing (33 per cent), and distribution (13 per cent), often combined on site or in different UK locations. A tenth had an HQ functions and just under a fifth R&D activities. It was noted from the interviews with businesses that a number of manufacturing firms had transferred their assembly activities overseas (to the Far East and some parts of Europe) although their sales/marketing activities remained in the UK to serve the domestic and European markets. See Table 3.2.

Table 3.2 Main activities in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
HQ/management	10	9	**19**	5	4	13
Manufacturing /assembly	25	**40**	**9**	**39**	25	**11**
R&D	3	0	5	**7**	0	0
Distribution	13	10	7	12	20	18
Sales/marketing	33	34	30	28	38	34
Back-up administration	4	0	3	3	7	5
Other	13	8	**28**	**6**	**4**	19

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q2A)

3.4.4

The main countries where FDIs originated or started up were the USA and Canada (some 30 per cent), France, the Netherlands, Denmark, Sweden and Italy, with between 3 per cent and 5 per cent (with a total of 39 per cent from Europe), some 13 per cent from the Far East (6 per cent from Japan, and 5 per cent from Australia and New Zealand), and some 4-5 per cent from other locations in the world.

3.4.5

The majority of businesses (56 per cent) opened a new branch or plant in the UK with the proportion slightly higher in retailing. A third invested in the UK through a merger or acquisition (especially in financial services and high-tech). The periods in which the initial investments were made are shown in Table 3.3. The flow increased from the mid-1970s onwards (i.e., 89 per cent); just 11 per cent invested prior to 1976. In the period 1976 to 2000 just over half invested initially in the UK (with the higher shares in conventional manufacturing and retail). In the period since the millennium finance and business services were more likely to invest in the UK with just over half of businesses in this sector investing in this period.

Table 3.3 Year original investment was made in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Before 1900	0	0	0	1	0	0
1900 to 1950	3	3	2	**8**	3	0
1951 to 1975	8	**14**	2	6	10	4
1976 to 2000	55	60	44	57	63	52
2001 to 2012	34	**23**	**53**	28	25	44

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q5BND)

3.4.6
The period over which FDIs have been in the UK is potentially important in terms of the likely impact on the innovation activities of their suppliers. This can be because it takes time for the impacts of innovation to feed through (in particular the transition from R&D to the development of products and services). Hence FDIs that have invested earlier in the UK will potentially have stronger impacts on the innovation activities of their suppliers where the relationship has matured over time.

3.4.7
The size and scale of the FDI could also influence the innovation impact on suppliers. One measure of this is employment size. The employment size in the UK. The median number of employees for all sectors was 48 with lower numbers in retail (26) and the largest businesses in financial services (70). The overall mean was 329 with higher averages in high-tech and financial services and the lowest average in conventional manufacturing.

3.4.8
A key measure of innovation is the degree to which products and services are developed and whether these are new to the market, along with the registration of patents. Half the businesses had introduced new or significantly improved products in the past three years with activity highest in retail (with for example new fashion items, white goods, and food products), high-tech, and conventional manufacturing. In terms of these being new to markets, just under a third considered they were (with almost two in five in the financial services sector). See Table 3.4.

Table 3.4 Introduction of new or significantly improved products/processes and IP in the last three years

Products	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastructure
Yes	51	55	46	55	54	39
No	41	35	45	34	43	52
Not sure	8	10	9	11	3	10
Processes						
Yes	38	37	32	41	40	40
No	52	48	62	43	52	52
Not sure	11	14	6	17	8	8
IP						
Yes	10	**17**	4	16	8	5
No	70	66	76	**57**	70	**86**
Not sure	20	17	20	27	22	9

Source: PACEC Survey of Inward Investors, 2012 (Q7A1)

3.4.9
Just over a third of businesses had introduced new or significantly improved processes in the past three years. Retail (with online sales and booking), the infrastructure sector, and high-tech were slightly more active. In terms of these being new to markets, a quarter said they were with a third in the high-tech sector. See Table 3.4.

3.4.10
A quarter of businesses had used new technologies in the past three years, with a third of high-tech businesses claiming this, and just under a third in conventional manufacturing.

3.4.11
Just under one in ten businesses had registered or applied to register a patent in the past three years. The conventional manufacturing sector was highest at 17 per cent with high-tech at 16 per cent. The financial services and infrastructure sectors were relatively low. See Table 3.4.

3.5 The suppliers of FDIs

3.5.1
The suppliers of the FDIs surveyed were distributed across the main sectors which applied to the FDIs above. The primary broad activities on site were a combination of

manufacturing/assembly (for six out of ten), sales and marketing (12 per cent), and distribution (9 per cent), often combined on site or in different UK locations. Just over a tenth had an HQ or management function.

3.5.2

The companies had started up in business over the past 100 years; with 40 per cent in the period 1951 to 1990. Since the millennium, just over a third had started up with a reduction from 2004 onwards. See Table 3.5.

Table 3.5 Year company started in the UK

	Percentages of all respondents
Before 1900	4
1900 to 1950	11
1951 to 1975	20
1976 to 1990	20
1991 to 1999	15
2000 to 2004	15
2005 to 2009	10
2010 to 2012	6

Source: PACEC Survey of businesses, 2011 (Q3)

3.5.3

The businesses ranged in size, with median of 40 and a mean of 314 in the UK.

3.5.4

In the past three years almost six in ten businesses introduced new or significantly improved products (while for four in ten these were new to the market). Some four in ten claimed they had introduced new or significantly improved processes (and for a quarter of suppliers these were new to the market). A quarter had used what they regarded as new technology, and 13 per cent had registered or applied to register intellectual property/ patents in the UK. See Table 3.6.

Table 3.6 The innovation activities of suppliers in the last three years

	Percentages of all respondents
Introduced new or significantly improved products/services	57
Products/services new to market	39
Introduced new or significantly improved processes	41
Processes new to market	23
Used new technologies in the UK	23
Registered/applied for IP/patents	13

Source: PACEC Survey of businesses, 2011 (Q3)

3.5.5
Just under half the suppliers said they had supplied up to 25 inward investors to the UK, while a fifth supplied 26 to 50, and a third sold their products and services to more than 50 FDIs.

3.6 UK-owned Businesses

3.6.1
The UK-owned businesses formed part of the research to enable some comparisons to be made with the FDI businesses. This section outlines their characteristics, using the same factors that were used to describe the FDI businesses. The UK-owned businesses comprised five main sectors, with conventional manufacturing, financial and business services, and retail and hospitality representing around a quarter each, high-technology, one in six, and infrastructure one in ten. The details of the sectors were those used for the FDIs above.

3.6.2
The primary broad activities in the UK were a combination of manufacturing/assembly (16 per cent), sales and marketing (37 per cent), and distribution (5 per cent), often combined on site or in different UK locations. Just over a tenth had an HQ or management functions and one in twenty, R&D activities. See Table 3.7.

Table 3.7 Main activity in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
HQ/management	14	10	**23**	11	7	18
Manufacturing /assembly	16	**46**	**1**	6	14	0
R&D	4	0	**12**	7	0	0
Distribution	5	5	1	8	7	10
Sales/marketing	31	22	16	40	58	10
Back up administration	2	0	2	13	0	0
Other	28	17	**44**	15	**13**	**62**

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q2)

3.6.3
The periods in which the businesses started up are shown in Table 3.8. The flow increased from the mid-1970s onwards (i.e., 85 per cent of the total) with just 15 per cent prior to 1976. In the period 1976 to 2000 just over a third started up in business (with the higher shares in retail). In the period since the millennium finance and business services were more likely to start trading, with just over half of businesses overall starting in this period.

Table 3.8 Year business started in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Before 1900	1	2	0	0	0	0
1900 to 1950	3	3	1	6	4	0
1951 to 1975	12	13	**5**	17	21	5
1976 to 2000	35	42	33	28	25	**63**
2001 to 2012	50	40	**62**	49	50	31

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q3)

3.6.4
The period over which businesses have been trading is important, in terms of the likely impact on the innovation activities of their suppliers. This can be because it takes time for the impacts of innovation to feed through (in particular the transition from R&D to the development of products and services). Hence businesses that were trading earlier will potentially have stronger impacts on the innovation activities of their suppliers where the relationship has matured over time.

3.6.5
The size and scale of the UK-owned businesses could also influence the innovation impact on suppliers. One measure of this is employment size. The median number of employees for all sectors was 20, with lower numbers in infrastructure and the largest businesses in high-technology. The overall mean was 336, with higher averages in retail and financial service, and infrastructure the lowest average in conventional manufacturing.

3.6.6
A key measure of innovation is the degree to which products and services are developed and whether these are new to the market, along with the registration of patents. A quarter of businesses had introduced new or significantly improved products in the past three years, with activity highest in retail (with for example new fashion items, white goods, and food products) and conventional manufacturing. In terms of these being new to markets, a quarter considered they were (with almost three in five in the high-tech sector). See Table 3.9.

Table 3.9 Introduction of new or significantly improved products/processes and IP in the last three years

Products	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastructure
Yes	25	23	26	**56**	17	n/a
No	72	72	74	**44**	82	n/a
Not sure	3	6	0	0	2	n/a
Number of respondents (rate=%)	*131*	*47*	*28*	*16*	*38*	*1*
Processes						
Yes	25	23	33	28	18	18
No	70	71	65	66	81	64
Not sure	5	6	3	5	1	17
IP						
Yes	3	0	5	12	0	0
No	94	98	93	86	92	100
Not sure	3	2	2	2	**8**	0

Source: PACEC Survey of Inward Investors, 2012 (Q5)

3.6.7
A quarter of businesses had introduced new or significantly improved processes in the past three years. Financial services (with online services) and high-tech were slightly more active. In terms of these being new to markets, one in ten said they were, with a quarter in the high-tech and financial services sectors.

3.6.8
Just 3 per cent of businesses had registered or applied to register a patent in the past three years. The high-tech sector was highest at 12 per cent. The other sectors were relatively low.

3.6.9
A little over one in ten businesses had used new technologies in the past three years, with two out of five high-tech businesses claiming this.

3.7 The suppliers of UK-owned businesses

3.7.1
The research also sought to compare the suppliers of FDI businesses to the suppliers of UK-owned businesses. This section sets out the characteristics of the latter. The suppliers of the UK-owned businesses surveyed were distributed across the sectors used for the FDIs above.

3.7.2
The primary broad activities on site were a combination of manufacturing/assembly (for four out of ten), sales and marketing (14 per cent), and distribution (12 per cent), often combined on site or in different UK locations. Almost a fifth had an HQ or management function.

3.7.3
The companies had started up in business over the past century; with a third in the period 1951 to 1990. Since the millennium, almost two out of five had started, with the numbers spread relatively evenly over time. See Table 3.10.

3.7.4
The businesses ranged in size, with median of 20 employees, and a mean of around 400 in the UK.

3.7.5
Around a third of suppliers had up to 25 UK businesses that they supplied. A third had 26 to 50, and a third, over 50 that they supplied.

Table 3.10 Year company started in the UK

	Percentages of all respondents
Before 1900	3
1900 to 1950	3
1951 to 1975	13
1976 to 1990	23
1991 to 1999	20
2000 to 2004	14
2005 to 2009	12
2010 to 2012	13

Source: PACEC Survey of businesses, 2011 (Q3)

3.7.6
In the past three years, a quarter of businesses introduced new or significantly improved products (while one in six of these were new to the market). A fifth claimed they had introduced new or significantly improved processes (and for a tenth of suppliers these were new to the market). Just 4 per cent had used what they regarded as new technology, and 3 per cent had registered or applied to register intellectual property/patents in the UK. See Table 3.11.

Table 3.11 The innovation activities of suppliers in the last three years

	Percentages of all respondents
Introduced new or significantly improved products/services	23
Products/services new-to-market	14
Introduced new or significantly improved processes	20
Processes new-to-market	9
Used new technologies in the UK	4
Registered/applied for IP/patents	3

Source: PACEC Survey of businesses, 2011 (Q3)

4 THE SELECTION OF SUPPLIERS

4.1 Introduction

4.1.1
This chapter examines how FDI businesses and UK-owned businesses select their suppliers in the UK from the outset and the role that the innovation practices of suppliers plays in their selection. **The chapter reflects the first stage in the process where FDIs may use innovation capability criteria to choose suppliers. This potentially leads to ultimate impacts as depicted in section 1.2 of the introduction.** The chapter begins with an analysis of how the businesses use the selection criteria. It is followed by an overview of the different types of suppliers that the businesses, then choose to work with.

4.2 The summary results

4.2.1
The Panel below shows the main criteria used by the FDIs and UK-owned businesses to select their suppliers.

Panel 4.1 The summary of results

The FDIs mainly locate in the UK to access the UK and European markets and to grow their businesses – but the innovation capability of suppliers and the innovation environment in the UK can also play a role.

- The general business capability of suppliers is important to the FDIs especially the extent to which suppliers are efficient and cost competitive while providing satisfactory levels of quality and reliability.
- To support the selection of suppliers the FDIs mainly look for their ability to manage innovation and collaborate with them. One in ten seeks R&D skills and practices and/or technological competence and capability, together with the ability to use technology effectively in products and services. The high-technology FDIs place more emphasis on these characteristics along with the retail and hospitality sectors that look for design capabilities for consumer goods, display and advertising material.

The UK-owned businesses apply similar criteria to the FDIs when choosing suppliers but generally place less weight on them. By contrast, high-tech, UK-owned businesses highlight R&D skills and practices and technological competence more than their FDI counterparts. The regression analysis shows that, independently of other key characteristics such as carrying out manufacturing and R&D in the UK, having an explicit strategy or policy to develop suppliers' innovation practices, and providing direct innovation assistance, FDIs were in fact less likely than UK companies to use innovation criteria when selecting suppliers.

4.3 FDIs: The criteria used for selecting suppliers

4.3.1
The search for suppliers is critical for FDIs, although it is not the primary reason for locating in the UK which is sales and revenue driven and the proximity to UK and European markets.

The selection criteria were examined initially in terms of the general business management capabilities of suppliers. The analysis then turns to the ability to manage innovation issues, in terms of their R&D and innovation skills and practices, and their technological competence and absorptive capacity[6] of suppliers. The general business capability criteria were more important to FDIs when selecting their suppliers, compared to the innovation criteria. Two-fifths of FDIs selected suppliers according to how efficient they were (i.e. in terms of prices and costs to them) and quality/reliability (which in part relates to their management ability). Other important factors (selected by around a quarter) were the ability to comply with the FDI standards and methods, and the reputation of suppliers. The criteria used were similar for all sectors, but with conventional manufacturing placing more emphasis on efficiency and quality/reliability compared to the other sectors (see Table 4.1).

Table 4.1 Criteria used by FDIs to select their suppliers: General business capability

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Located close to you	17	17	10	16	24	20
Management ability/practices	5	5	3	10	4	6
Efficiency/costs	60	68	50	63	58	62
Quality/reliability	58	69	53	**69**	46	55
Business viability /size and capacity	5	7	8	5	2	2
Labour skills	3	1	2	5	3	5
Able to comply with our standards /methods	26	30	33	24	24	17
Reputation/image of the supplier	28	36	20	37	22	23
None	31	23	41	22	37	29

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q12A)

4.3.2

With regard to general innovation capabilities, the most important criteria were the ability to manage innovation and collaborate with FDIs and exchange knowledge. However, relatively small numbers of FDIs cited these factors as reasons for selecting their suppliers, as they put much more weight on efficiency and costs, together with quality and reliability (as shown above). The exception to this were the high-tech sectors (just over one in ten)

placed more emphasis on the ability to manage innovation, collaborate with FDIs, and the innovation skills of suppliers and the infrastructure sector, where over one in ten looked for the ability of suppliers to acquire, adapt and commercialise knowledge. See Table 4.2.

Table 4.2 Criteria used by FDIs to select their suppliers: Innovation

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Ability to manage innovation	7	3	8	12	8	6
Innovative skills	5	3	5	**10**	4	1
Ability to exchange knowledge/ information	6	3	10	9	5	3
Ability to acquire, adapt and commercialise knowledge	5	3	2	7	5	**12**
Links/collaboration with other external organisations	2	0	0	**6**	2	2
Ability/willingness to collaborate with your business	7	3	5	11	10	7
None	87	**97**	85	84	85	79

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q12C)

4.3.3

For all sectors, R&D and design skills and practices amongst suppliers were more important (selected by one in ten FDIs) than general innovation skills and practices and technology issues (selected by less than one in ten), and for retail/leisure the design input for products was especially important. The retail and high-tech sectors (around one in six) placed more emphasis on R&D/design skills. See Table 4.3.

Table 4.3 Criteria used by FDIs to select their suppliers: R&D/design capabilities

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
R&D skills	11	6	7	14	18	7
R&D practices	10	4	5	11	16	10
None	89	95	93	86	82	90

Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q12B)

4.3.4

The primary technology criteria, selected by a small group of FDIs were technological competence and capabilities of suppliers, the level of technology used by suppliers (as leading edge or more conventional) and the ability to operationalise it for products, services and processes. The high-tech FDIs placed more importance on the level of technology in their suppliers (i.e. for services and equipment), technological competence and capability, and the ability to validate technology and operationalise technology for products and services (an important part of the absorptive process). See Table 4.4.

Table 4.4 Criteria used by FDIs to select their suppliers: Technology

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Level of technology	7	**0**	9	11	9	6
Technological competence/ capability	9	5	4	**15**	12	8
Ability to recognise technology principles and functions	4	0	0	**9**	8	0
Ability to validate technology	4	0	1	**10**	4	5
Ability to demonstrate feasibility of technology/ find solutions	3	0	0	**8**	7	2

Ability to operationalise technology for products/services /process	7	5	1	**14**	10	2
None	86	**95**	88	**78**	85	85

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q12D)

4.4 UK Businesses: The criteria used for selecting suppliers

4.4.1

The selection criteria used by UK businesses for suppliers mirrored those for the FDI businesses above. The general business capability criteria were more important to UK-owned businesses when selecting their suppliers, compared to the innovation criteria. Two-thirds of UK-owned businesses selected suppliers according to how efficient they were (i.e. in terms of prices and costs to them) and quality/reliability (which in part relates to their management ability). Other important factors (selected by around half) were reputation and image, the ability to comply with their standards (a third), and the fact that suppliers were located nearby. The criteria used were similar for all sectors, but with conventional manufacturing placing more emphasis on efficiency, quality/reliability and reputation, compared to the other sectors (see Table 4.5).

Table 4.5 Criteria used by UK businesses to select their suppliers: General business capability

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Located close to you	21	16	26	15	22	24
Management ability/practices	6	4	7	6	7	9
Efficiency/costs	65	**82**	57	57	67	59
Quality/reliability	64	**83**	**52**	51	68	67
Business viability /size and capacity	10	13	**3**	5	**19**	6
Labour skills	9	**25**	**1**	2	9	6
Able to comply with our standards /methods	30	38	20	23	31	47

Reputation/image of the supplier	47	**63**	**35**	28	56	49
None	23	13	29	32	19	19

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q9)

4.4.2

With regard to general innovation capabilities, the most important criteria were the ability to collaborate with UK-owned businesses (10 per cent), and manage innovation (7 per cent). However, relatively small numbers of businesses selected these factors, as the efficiency/costs issues, and quality/reliability were more relevant (see above). The high-tech sector (i.e. one in six) placed more emphasis on the ability of their suppliers to collaborate with them and manage innovation. See Table 4.6.

Table 4.6 Criteria used by UK businesses to select their suppliers: Innovation

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Ability to manage innovation	7	7	6	12	4	5
Innovative skills	4	0	5	6	4	5
Ability to exchange knowledge/ information	6	4	7	9	5	5
Ability to acquire, adapt and commercialise knowledge	5	4	6	8	3	5
Links/collaboration with other external organisations	4	1	4	7	3	5
Ability/willingness to collaborate with your business	10	14	8	15	7	5
None	86	83	90	73	89	95
Number of respondents (rate=%)	*255*	*62*	*71*	*36*	*61*	*25*

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q9)

4.4.3

For all sectors, R&D and design skills and practices amongst suppliers were equally important (selected by 6 per cent of businesses) as general innovation skills and practices and technology issues, and for retail/leisure the design input for products was especially important. The high-tech businesses placed more emphasis on R&D/design skills (i.e. 25 per cent). See Table 4.7.

Table 4.7 Criteria used by UK businesses to select their suppliers: R&D/design

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
R&D skills	6	1	5	25	3	5
R&D practices	6	7	3	21	3	0
None	92	93	95	**75**	97	95

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q9)

4.4.4

In terms of the technology criteria, the key factors selected by a small group of businesses were technological competence and capabilities, and the level of technology (i.e. almost one in ten). The high-tech companies placed more importance on technological competence (a quarter) and the level of technology in their suppliers (i.e. for services and equipment), followed by the ability to validate technology measures, technology principles, solutions and operationalise technology (an important part of the absorptive process). See Table 4.8.

Table 4.8 Criteria used by UK businesses to select their suppliers: Technology

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc infrastruc-ture
Level of technology	7	1	10	18	3	5
Technological competence/ capability	9	4	10	**23**	8	5
Ability to recognise technology principles and functions	5	1	5	13	3	5

Ability to validate technology	5	0	3	17	5	5
Ability to demonstrate feasibility of technology/ find solutions	6	4	4	13	5	5
Ability to operationalise technology for products/services /process	5	2	6	3	8	5
None	88	94	85	75	89	95

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q9)

4.5 FDIs: The types of suppliers

4.5.1
The suppliers of FDIs and UK-owned businesses have been grouped into several broad categories reflecting the research, production, and distribution processes for businesses, i.e., R&D suppliers, the purchase of raw materials and components, capital equipment/ machinery, business services (for example, legal, accountancy, ICT, computing, and software development), and logistics and transport[7]. To assess the supplier profile for the purchasing businesses the scale by number of suppliers has been examined.

4.5.2
The survey shows that the vast majority of FDIs have suppliers in several main categories, including R&D/design, ICT with computing and software, capital goods and equipment and logistics and transport, with 95 per cent of FDIs, or just over, having 25 suppliers or fewer. The FDIs used slightly fewer suppliers in the materials and components categories (see Appendix Table A1.1).

4.5.3
Generally there was a view that the FDIs were seeking to reduce their numbers of suppliers in each of the categories and this had been a trend over the past decade as they sought to become more efficient and achieve economies of scale with fewer suppliers.

4.5.4
For a third of FDIs, a quarter of suppliers were foreign-owned; for 5 per cent, just over a quarter (26 per cent to 50 per cent) were foreign-owned; and 17 per cent, for more than half. However, some two-fifths were not sure whether their suppliers were foreign-owned. For all FDI businesses, three-fifths of all their suppliers were based in the UK, and the proportions were higher for the financial services and infrastructure businesses.

4.6 The types of suppliers for UK-owned businesses

4.6.1
The survey shows that the vast majority of UK-owned businesses have suppliers in all the main categories, i.e. R&D/design, ICT, computing and software, capital goods/equipment and transport/logistics. Almost all had 25 or fewer suppliers in these sectors. As with the FDI businesses, the UK-owned businesses used slightly fewer suppliers in the materials and components categories. See Appendix Table A1.2.

4.6.2
Generally there was a view that the UK-owned companies (as with the FDI firms) were seeking to reduce their numbers of suppliers in each of the categories and this had been a trend over the past decade as they sought to become more efficient and achieve economies of scale with fewer suppliers.

4.6.3
For almost two-thirds of businesses, a quarter of their suppliers were foreign-owned; for 1 per cent, just over a quarter (26 per cent to 50 per cent) were foreign-owned; and for 5 per cent, more than half. However, almost a third were not sure whether their suppliers were foreign-owned. The financial services and infrastructure sectors tended to have higher proportions of foreign-owned suppliers. For all UK-owned businesses, over four in five of all their suppliers were based in the UK, and the proportions were higher for conventional manufacturing, the financial services and high-tech sector.

5 THE IMPACT ON THE INNOVATION PRACTICES OF SUPPLIERS

5.1.1
Once the businesses have chosen their suppliers, **the core focus of the research was to examine the extent to which FDI businesses had recognisable impacts on the innovation practices of their suppliers. It also sought to examine whether UK-owned businesses had an impact on their suppliers and if it was similar to FDIs, or not. This reflects the second stage in the process set out in section 1.2 of the introduction, i.e. the impacts on R&D, technology solutions/applications (with testing/validations) and product/process development.** The analysis reflects illustrative stages in the innovation process. However, the process is not necessarily linear for FDIs and their suppliers, and can be iterative. The stages are used illustratively to help structure the analysis. **The focus is on stages 3 to 5 as shown in Figure 5.1.**

Figure 5.1 The innovation process and impacts

Source: PACEC

5.1.2
The results below are illustrated by tables and figures. More detailed tables are shown in the Appendices.

5.2 The summary results

5.2.1
The panel below summarises the results by comparing the views of FDIs to their suppliers and the views of UK-owned businesses to their suppliers. It then compares the results for FDIs and UK-owned businesses.

Panel 5.1 The summary of results

The research sought to examine the question of whether the FDIs had a recognisable impact on the innovation practices of their suppliers, and on innovation management, R&D, technology and products and services. It also sought to examine whether UK-owned businesses had an impact on their suppliers, and if it was similar to the FDIs, or not.

Innovation Impacts: FDIs and their suppliers

The FDIs claim to have a recognisable impact on the overall innovation activities of their suppliers. Some one in five claimed this, while twice as many of their suppliers acknowledged the impact.

In terms of innovation capabilities, around one in five FDIs highlighted impacts on the willingness of suppliers to collaborate and share knowledge, with positive impacts on their innovation skills. Their subsequent impact on the supplier practices can apply to R&D, the development of technologies, with validation and testing and the products, processes and services that result as part of the innovation process. Generally, some one in five claim these impacts.

Generally the suppliers to FDI businesses were on average twice as likely to acknowledge the impact on their practices, and their need to adapt, compared to the FDI businesses themselves. The main influences on this are the requirements for the suppliers to adapt in order to retain and develop the FDIs as customers and benefit from the sales opportunities. While FDI businesses recognise the changes taking place the suppliers are more aware of them as they have the responsibility of directly implementing and resourcing them (albeit in some cases by working jointly with the FDIs).

Innovation management

- Between a sixth and a quarter of FDIs cited impacts especially in terms of the willingness of suppliers to collaborate (a quarter), the ability to exchange information (a fifth), and innovation skills. Just over a third to a half of suppliers cited these impacts. One in two became more willing to collaborate, while around four in ten adapted to exchange knowledge and information and develop their innovation skills.

R&D activities

- While around one in six FDIs claimed to have an impact on the R&D skills and practices of suppliers some one-third of the latter considered they had made adjustments

Technology impacts

- The development of technology with feasibility, testing, and validation, is a key stage in the innovation process. Almost four in ten suppliers acknowledged the impacts of FDIs on their development of technology compared to one in five to one in six FDIs.

Products and processes

- Supplier products and services feed, in many cases, directly into the end products and services of FDIs. Some two in five suppliers acknowledged the impact of the FDIs as against one in six FDIs. Similarly, a third of suppliers considered that they had adapted their processes as a result of engagement with FDIs. One in six FDIs claimed this impact.

Innovation impacts. UK-owned businesses and their suppliers

The UK-owned businesses also claimed impacts on the innovation practices of their suppliers. The suppliers were on average twice as likely to recognise the impacts on their R&D activities and development of technology, and three times more likely to recognise impacts on their development of products and processes, and on their ability to manage innovation and their innovation skills. However, only the half the owners of UK-owned businesses were likely to claim impacts on their suppliers compared to the FDIs.

Innovation management

- Around one in ten UK-owned businesses claimed impacts on the innovation management practices of their suppliers, especially their willingness to collaborate, exchange knowledge and their innovation skills. Around a quarter of suppliers acknowledged the impacts

R&D activities

- Almost one in ten UK-owned businesses claimed to have impacts on the R&D activities of their suppliers. Some one in five suppliers recognised these impacts.

Technology

- One in ten UK-owned businesses cited their impact on the ability of suppliers to develop and apply appropriate technologies. This impact was acknowledged by a quarter of suppliers.

Products and processes

- Almost one in ten UK-owned businesses said they had influenced the development of products and processes amongst the suppliers, while around a quarter of the latter acknowledged these impacts.

Innovation impacts. FDI and UK-owned businesses compared

A key issue is whether FDIs have greater impacts on suppliers than UK-owned businesses. On average the FDI businesses were twice as likely to claim impacts on their suppliers (for all stages of the innovation process) compared to the UK-owned businesses.

Innovation management

- While one in five FDIs claimed impacts on the overall innovation management capabilities of their suppliers (especially on collaborative activity with them), some one in ten UK businesses did so.

R&D activities

- Some one in six FDI businesses cited positive impacts on the R&D activities of their suppliers (especially on R&D skills). Almost one in ten UK-owned businesses claimed these impacts.

Technology impacts

- Some one in six FDI businesses cited impacts on the ability of their suppliers to develop technologies compared to one in ten UK-owned businesses.

Products and processes

- One in six FDI businesses claimed positive impacts on the development of products and processes amongst suppliers. Almost one in ten UK-owned businesses claimed similar types of impacts. These findings show consistently higher impacts for the FDIs.

Innovation impacts. Suppliers of FDI and UK-owned businesses

On average the FDI suppliers were twice as likely to acknowledge that they had adapted to meet the innovation requirements of FDI businesses compared to the suppliers of UK-owned businesses.

Innovation management

- While a third to almost half of FDI suppliers made adjustments to their innovation management practices (especially to collaborate and exchange knowledge with FDIs), just over a fifth to just over a quarter of suppliers to UK businesses did so.

R&D practices

- A third of suppliers to FDIs adjusted their R&D practices for their customers compared to a fifth who did so to meet the requirements of UK-owned businesses.

Technology

- Almost four out of ten suppliers improved their development and application of technologies to meet the requirements of FDIs. This compares to around a quarter of suppliers to UK-owned businesses who did so.

Products and processes

- Some four-in-ten suppliers to FDIs improved their products and a third developed their processes for the FDIs. The comparative figures for suppliers to UK-owned businesses were a quarter and a fifth respectively.

5.2.2
The next stage in the analysis is to show the main findings for each group of companies.

5.3 Innovation impacts: FDIs and their suppliers

FDIs

5.3.1
The FDIs have a recognisable impact on their suppliers, and this was greater than the impact of UK businesses overall (see below). However, the suppliers of FDIs cited greater impacts than the FDIs themselves. Overall, the research shows that the impacts were fairly evenly spread across the innovation stages from R&D to technology and product development. However, the suppliers on balance claimed that the impacts are stronger than those cited by the FDIs. The primary reason they gave is that they are more directly aware of the adjustments they make and how they are resourced. Some suppliers demonstrate these to the FDIs to show that they are willing and adaptable. Others place less emphasis on this, possibly in an attempt to convey the sense that they complied with innovation practices and standards required anyway.

5.3.2
The narrative reflects the innovation process and starts with the impacts on the general innovation capabilities of suppliers. Between a quarter and one in six FDI businesses claimed to have an impact on general innovation practices of their suppliers. The main impacts were the ability and willingness of suppliers to collaborate with FDIs (24 per

cent); while the other areas claimed by one in six were the ability to exchange knowledge/ information, develop skills for innovation and manage the innovation process as well as their absorption capacity. The high-tech FDIs had the strongest impact, with almost one in three claiming positive collaborative impacts, and a quarter impacts on the management of innovation, knowledge exchange, and influence over the degree of collaboration with external (third party) organisations. See Table 5.9 below.

5.3.3

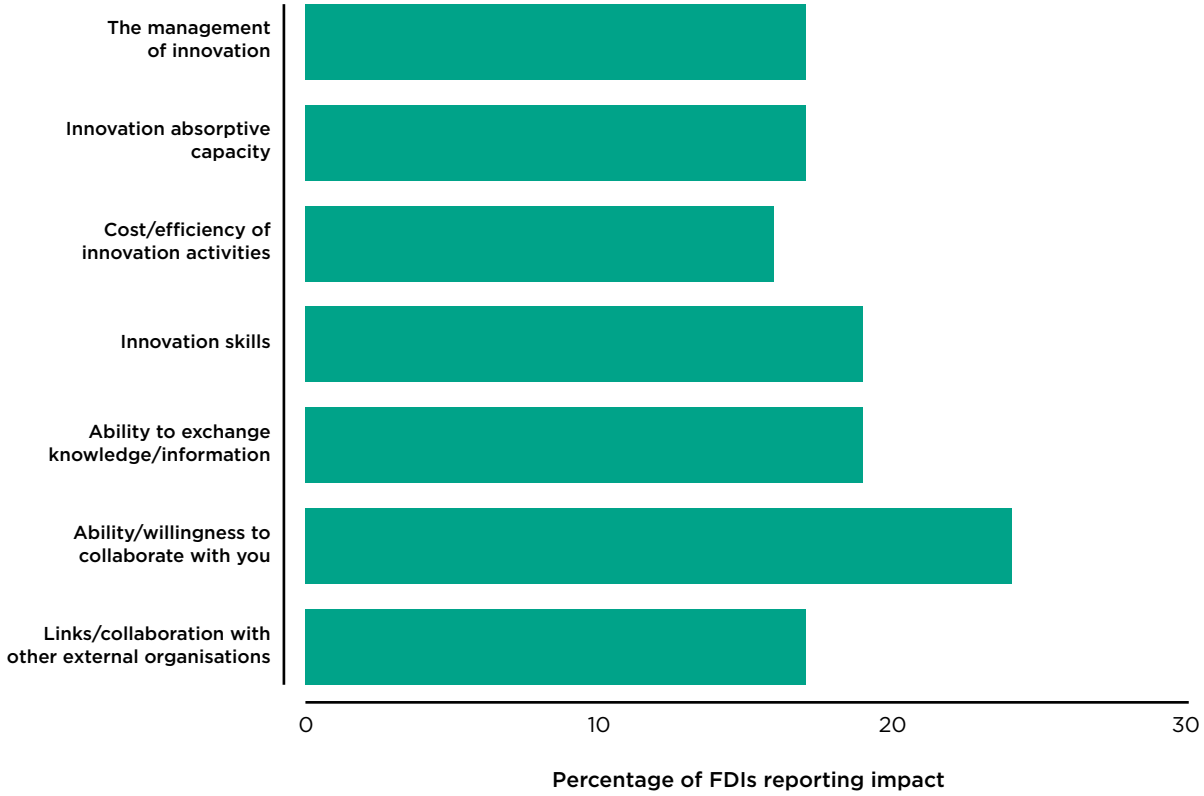
Further analysis of the survey data showed considerable variation according to the country of origin of the FDI business, as well as its size (i.e. number of people employed in the UK). Overall, FDIs from the US were significantly more likely than the rest to have an impact on the innovation capabilities of their suppliers. They were followed, in order, by those originating from the rest of Europe, Germany, France and the Benelux countries, and from the rest of the world. Thus, with regard to impacts on innovation practices, between a quarter and two-fifths of the US FDIs cited the ability and willingness of their suppliers to collaborate (39 per cent), the absorptive capacity (31 per cent), innovation skills (29 per cent), collaboration with other external organisations (29 per cent), management of innovation (28 per cent), the cost and efficiency of innovation activities (27 per cent), and the increased ability to exchange knowledge and information (23 per cent). By comparison, only between a fifth and a quarter of FDIs from the rest of Europe described having similar impacts. The proportions were significantly lower for the FDIs from other parts of the world.

Table 5.9 FDIs reporting an impact on the innovation capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
The management of innovation	17	18	13	23	20	16
Innovation absorptive capacity	17	18	18	21	12	15
Cost/efficiency of innovation activities	16	20	13	20	13	13
Innovation skills	19	19	14	25	20	16
Ability to exchange knowledge/ information	19	20	19	26	15	16
Ability/willingness to collaborate with you	24	22	26	31	21	18
Links/collaboration with other external organisations	17	17	17	23	13	22

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q9)

Figure 5.2 FDIs reporting an impact on the innovation capabilities of their suppliers



Source: PACEC Survey of Inward Investors, 2012 (Q13)

5.3.4

It is perhaps unsurprising that the extent of the impacts that FDIs had had on the innovation capabilities of their suppliers appeared to be linked to the size of the FDI; the larger the FDI, the more likely were its impacts on all areas of innovation. Thus between a quarter and two-fifths of the FDIs with 250 or more employees cited, variously, the impacts on: the ability and willingness of suppliers to collaborate with the FDI (39 per cent) and other external organisations (31 per cent); exchange knowledge and information (30 per cent); improve efficiency of innovation activities (30 per cent); innovation skills (29 per cent); management of innovation (29 per cent); and improvement in absorptive capacity (25 per cent). See Appendix Table A1.20.

5.3.5

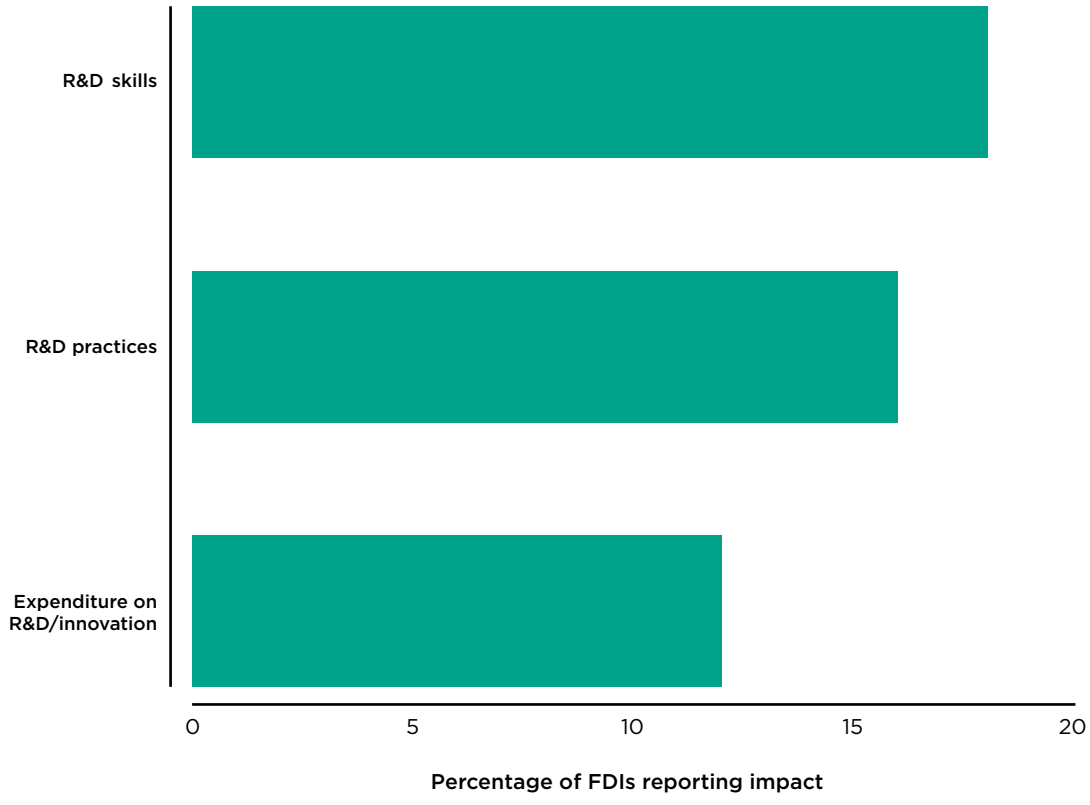
R&D is a key stage in the innovation process to explore concepts, the research issues and their outputs in developing technologies and products and services. Some one in six FDIs claimed to have an impact on the research, development, and design skills and practices of their suppliers. The greatest impacts were claimed by the high-tech, infrastructure, and retail/leisure sectors. The other sectors identified fewer impacts. See Table 5.10.

Table 5.10 FDIs reporting an impact on the R&D capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D skills	18	15	13	23	20	23
R&D practices	16	12	13	23	18	18
Expenditure on R&D /innovation	12	9	12	17	11	12

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Figure 5.3 FDIs reporting an impact on the R&D capabilities of their suppliers



Source: PACEC Survey of Inward Investors, 2012 (Q13)

5.3.6

Here, as well, there were observed differences of the impacts on the research and development capabilities of suppliers, according to the country of origin of the FDI or its size. The disaggregated data showed that FDIs from the rest of Europe (26 per cent) and the US (21 per cent) were significantly more likely to cite impacts on the R&D skills of their suppliers. These were much higher than the case for FDIs from Germany (15 per cent), the rest of the world (11 per cent), and France and the Benelux countries (7 per cent). The same was true for suppliers' R&D practices, with a quarter of FDIs from the rest of Europe (25

per cent) and a fifth of those from the US (21 per cent) citing those impacts. On the other hand US FDIs (21 per cent) indicated much higher impacts on their suppliers' expenditure on R&D and other innovation than those from the other countries.

5.3.7
In terms of size, the disaggregated data indicated that except in the case of the smallest businesses (i.e. with up to ten employees), the impact of FDIs on the R&D capabilities of their suppliers were much more evenly distributed across the rest of the size groups. With regard to R&D skills, they ranged from between one in six of those with 11-19 employees (17 per cent) and one in five of the largest businesses (20 per cent).

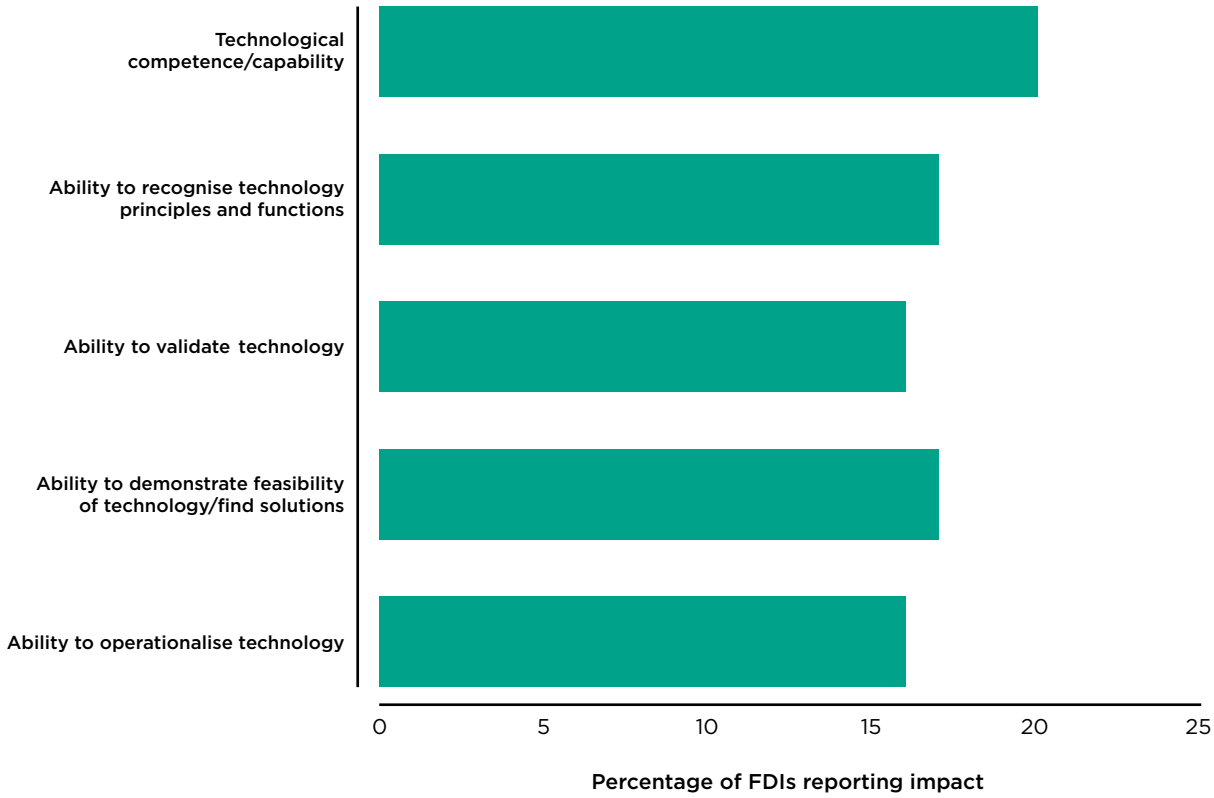
5.3.8
The technologies and their application frequently arise from the R&D stage, and become more applied through feasibility testing, validation and operationalisation. Some one-in-six FDIs said they had positive impacts on the technological capability of their suppliers and their ability to recognise technology functions, validate and operationalise technology, i.e. the absorptive capacity. These features are linked, and demonstrated an influence over the absorptive capacity of suppliers. Again, impacts were higher in the high-tech sector, where a quarter claimed impacts and one in ten identified strong impacts. The other sectors said the impacts were more likely to be moderate rather than strong. See Table 5.11.

Table 5.11 FDIs reporting an impact on the technological capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastructure
Technological competence/ capability	20	21	17	25	17	14
Ability to recognise technology principles and functions	17	15	12	23	20	12
Ability to validate technology	16	14	12	23	18	20
Ability to demonstrate feasibility of technology / find solutions	17	18	12	23	20	14
Ability to operationalise technology	16	16	17	21	14	13

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Figure 5.4 FDIs reporting an impact on the technological capabilities of their suppliers



Source: PACEC Survey of Inward Investors, 2012 (Q13)

5.3.9
The survey data was analysed further in order to assess the influence of country of origin and size on technological capabilities. The noted impacts were similar to those found in respect of innovation, with the FDIs from the US and rest of Europe generating much higher impacts than the rest. For example, more than a quarter of the FDIs from the wider European regions (28 per cent) and the US (27 per cent) highlighted improved supplier technological competence and capability, compared with only one in ten FDIs from Germany and the rest of the world. There were similarly large differences regarding the impacts FDIs have had on the ability of suppliers to recognise technology principles and functions, validate technology, demonstrate the feasibility of technology and to operationalise technology.

5.3.10
With regard to size, the largest FDIs (with 250 or more employees) were more likely than the rest to have an impact on all areas of suppliers' technological capabilities. Between a fifth and a third of these indicated they have had an impact on technological competence (32 per cent), finding technological solutions (30 per cent), recognising technology principles (25 per cent), validating technology (23 per cent), and to operationalise technology (23 per cent). These impacts were lower for the other FDIs, and significantly so for the smallest among them.

5.3.11
The 'final' stage in the innovation process is the use of technologies in the development of products, services and processes, and their exploitation/commercialisation. The strongest impacts of the FDIs were on product and process development (claimed by about one

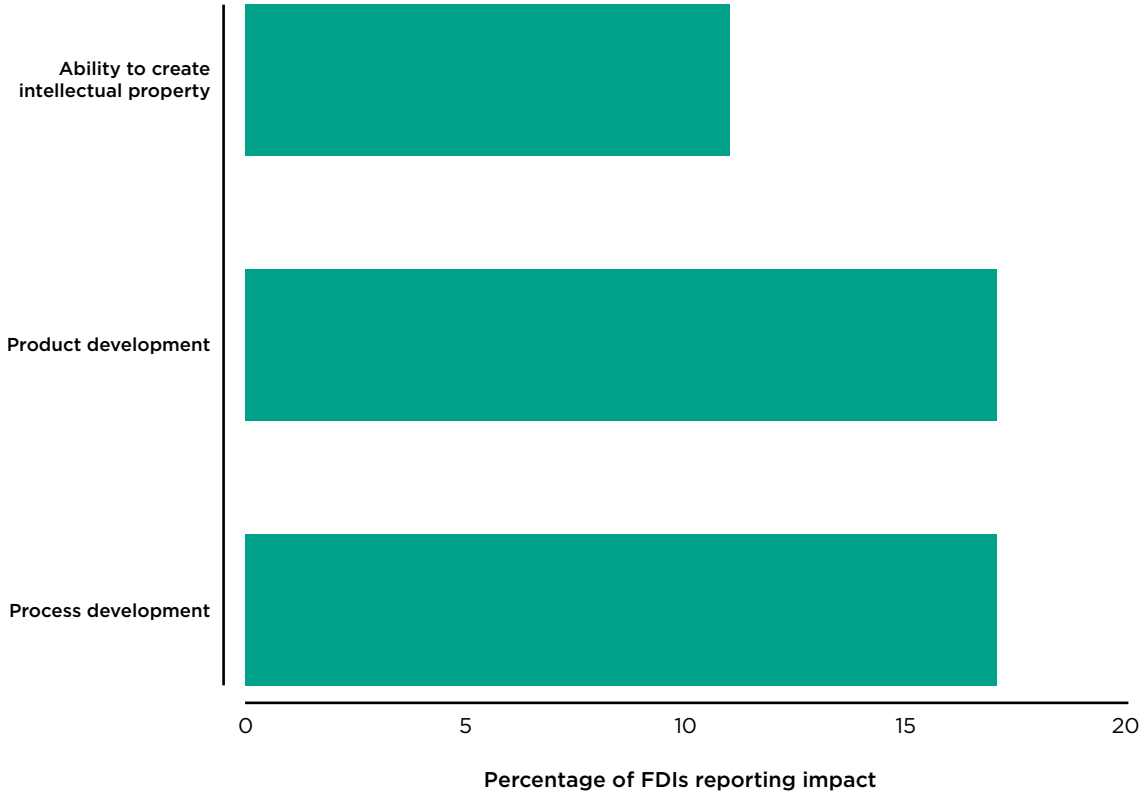
in six FDIs), rather than on the ability of suppliers to create intellectual property (one in ten). The impacts of the high-tech and retail sectors were greater, where a quarter claimed impacts on products and processes; with one in five high-tech firms citing impacts on intellectual property (with half the impacts seen as strong). See Table 5.12.

Table 5.12 FDIs reporting an impact on the intellectual property capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Ability to create intellectual property	11	8	6	**19**	11	14
Product development	17	17	9	24	23	13
Process development	17	14	14	22	20	14

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Figure 5.5 FDIs reporting an impact on the technological capabilities of their suppliers



Source: PACEC Survey of Inward Investors, 2012 (Q13)

5.3.12
The disaggregated data by country and size were consistent with the other results on innovation and technological impacts. With regard to influencing the ability of suppliers to create intellectual property, and to develop new products and processes, the FDIs from the US and wider European area were on the whole more successful than the others. For example, more than twice as many US and wider European FDIs, compared with the rest, claimed such impacts.

5.3.13
The results of the analysis by size provided much greater contrast from the impacts cited for innovation and technological capabilities. Here, there was not a linear relationship between business size and the observed impacts. Thus, for example, more than a quarter of FDI businesses with 100-200 employees (27 per cent) claimed an impact on product development among their suppliers, compared with a fifth of the largest FDIs (20 per cent). There were similar variations in relation to helping suppliers create intellectual property and to develop new processes.

5.3.14
Overall, the FDIs claimed to have had positive impacts on around 17 per cent of their suppliers (with strong impacts on 6 per cent). The impacts were greater for the high-tech sector (i.e., 20 per cent of suppliers) with the impacts fairly evenly spread across the other sectors, but with impacts on fewer suppliers.

5.3.15
In terms of types of suppliers where the impacts were strongest, the greatest impact for a fifth of suppliers was on those that provided materials and components (20 per cent), followed by 17 per cent of logistics suppliers. The high-tech companies had the highest impact on R&D suppliers, those supplying materials and components and capital goods/equipment. The conventional manufacturing sector claimed similar impacts on these types of suppliers, as well as logistics suppliers. The FDIs in the other sectors claimed the proportion of their suppliers affected was lower.

5.3.16
A statistical analysis of the survey results to ascertain which factors influence the likelihood that firms will have impacts upon the innovation capabilities of their suppliers is set out in Chapter 7. The key drivers are as follows:

- Conducting R&D in the UK.
- Developing new processes (all impacts) or products/services (particularly for strong impacts) in the last three years.
- Supplier selection criteria: general business practices (for all impacts) and R&D criteria (particularly for strong impacts).
- Collaboration with other organisations on innovation and technological issues.
- Provision of direct assistance to suppliers (various forms).

All these factors made companies more likely to report impacts upon their suppliers. Independently of these, it was found that FDI companies were more likely than UK companies to have impacts on the abilities of their suppliers to collaborate with them, and more likely to have strong impacts upon their R&D skills.

FDI Suppliers

5.3.17

The interviews with suppliers sought to explore the impact of FDIs to confirm or qualify the FDI views. They thought the impacts were greater than the FDIs did, mainly because they were directly responsible for making them. They also thought that the impacts were greater, compared to the views of the suppliers of UK-owned businesses. Overall, just over half of the suppliers considered that their FDI customers had had an impact on their innovation capabilities. For one in six, the impact was relatively strong, while for just over a third, it was considered to be moderate.

5.3.18

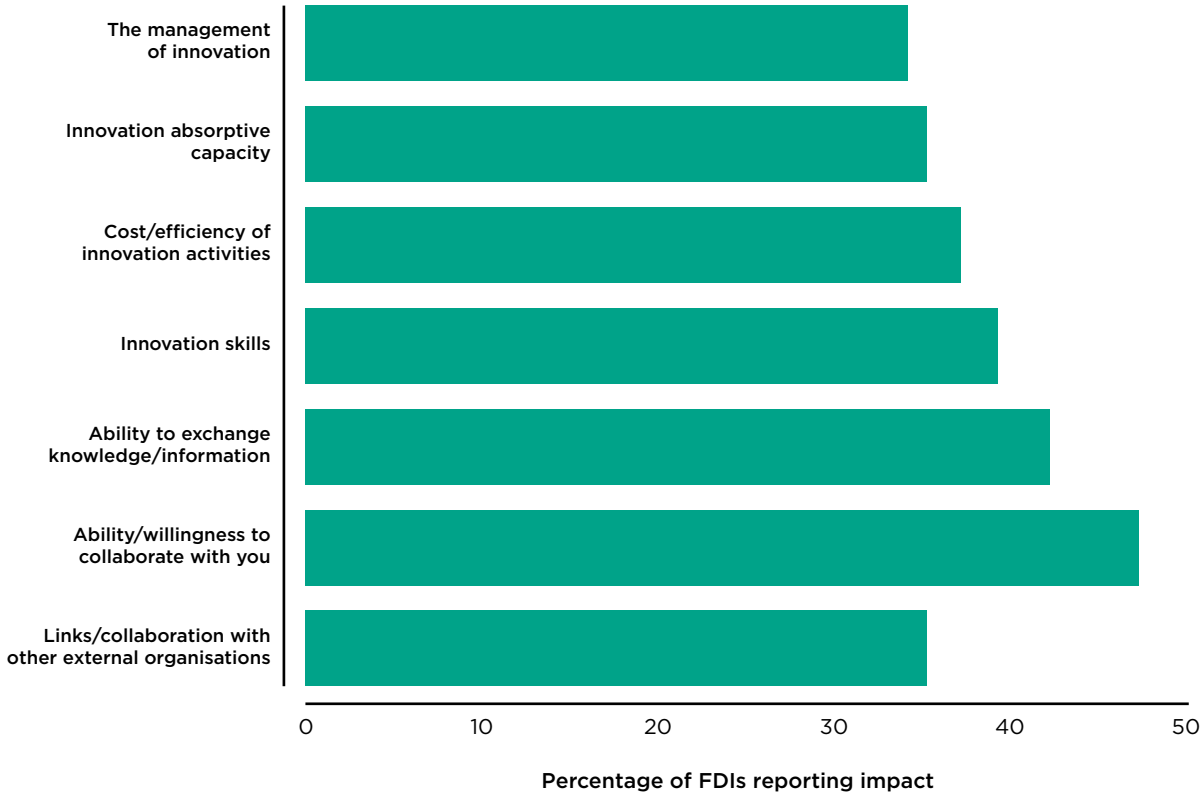
Between a third and half of suppliers considered that their FDI customers had an impact on their innovation practices, which confirms the claims of the FDIs. The highest impacts were on collaborative activities (47 per cent) and the exchange of knowledge and ideas (42 per cent). Almost two in five cited an impact on their innovation skills and innovation costs/ efficiency. Just over a third thought the FDIs had a positive impact on the management of innovation, their absorptive capacity and wider collaborative activities (with external organisations and others in the FDI supply chain). Generally for one in six the impacts were strong, and moderate for a third. These impacts reinforce one another over the range of innovation capabilities The data is presented in Table 5.13.

Table 5.13 Impact of FDIs on the innovation capabilities of suppliers

	Percentages of all respondents
	Any impact
The management of innovation	34
Innovation absorptive capacity	35
Cost/efficiency of innovation activities	37
Innovation skills	39
Ability to exchange knowledge/information	42
Ability/willingness to collaborate with you	47
Links/collaboration with other external organisations	35

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.6 Impact of FDIs on the innovation capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.3.19

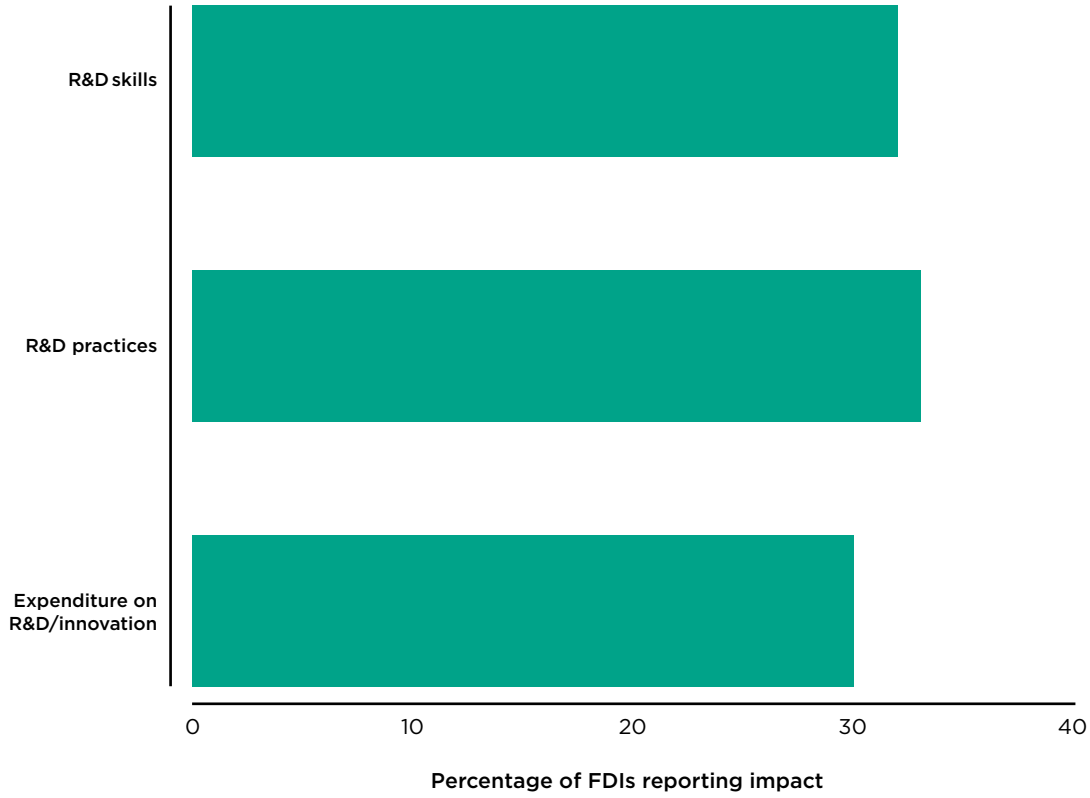
Around a third of suppliers said that their FDIs had an impact on their R&D and design activities, practices, skills, and increased expenditure on R&D and innovation. See Table 5.14.

Table 5.14 Impact of FDIs on the R&D capabilities of suppliers

	Percentages of all respondents
	Any impact
R&D skills	32
R&D practices	33
Expenditure on R&D/innovation	30

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.7 Impact of FDIs on the R&D capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

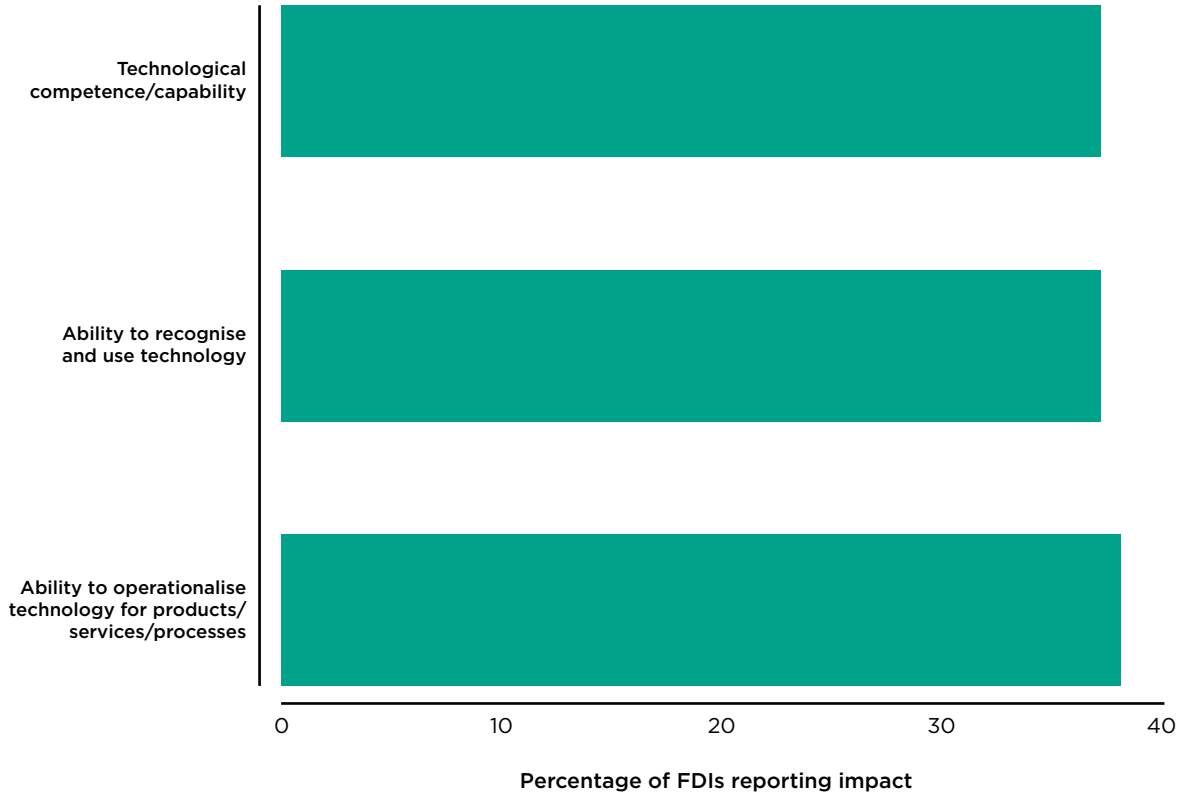
5.3.20
Almost two in five suppliers thought that their FDI had an impact on their technology capabilities and practices. These included technology competence and capability, the ability to recognise technological practices, and the feasibility of technology solutions and how to operationalise them. See Table 5.15.

Table 5.15 Impact of FDIs on the technology capabilities of suppliers

	Percentages of all respondents
	Any impact
Technological competence/capability	37
Ability to recognise and use technology	37
Ability to operationalise technology for products/services/processes	38

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.8 Impact of FDIs on the technology capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.3.21

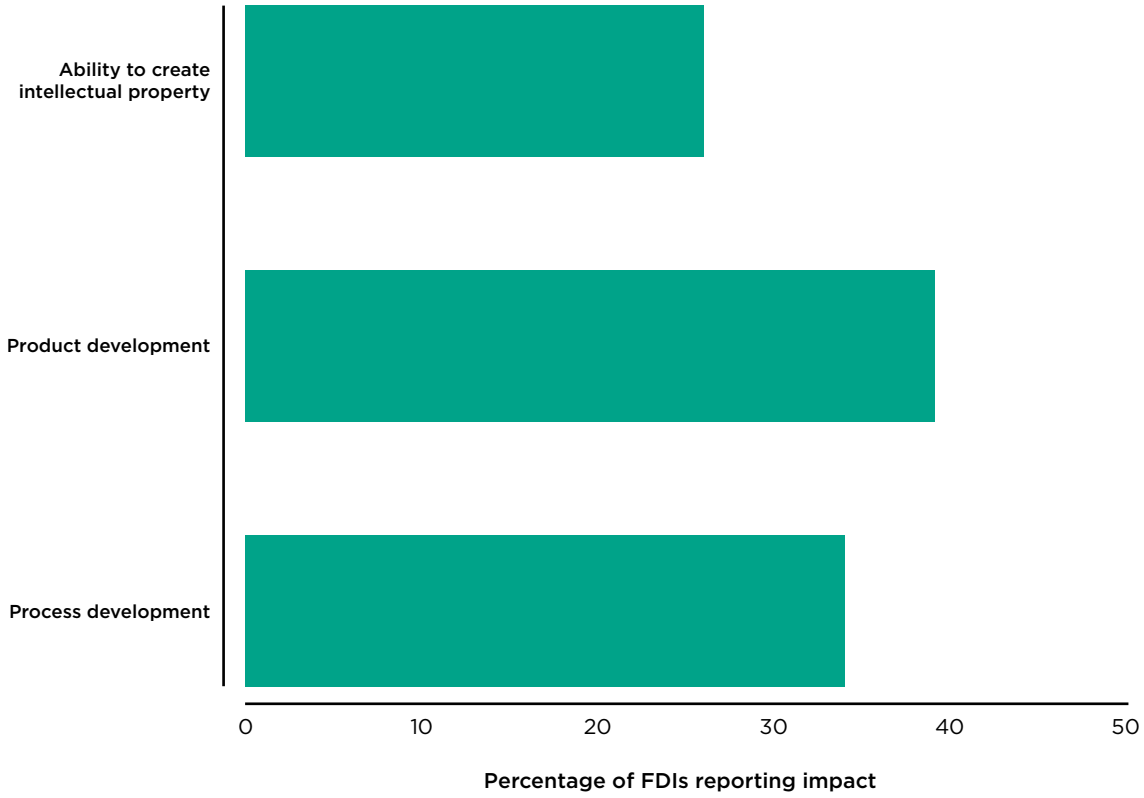
The final stage in the innovation process is the successful launch of products and services and their exploitation. The FDIs and suppliers share in this process. While a quarter of suppliers recognise the influence of the FDI in creating intellectual property, a third cited the impacts on process development, and two in five the contribution to direct product development. See Table 5.16.

Table 5.16 Impact of FDIs on the products, services and patents of suppliers

	Percentages of all respondents
	Any impact
Ability to create intellectual property	26
Product development	39
Process development	34

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.9 Impact of FDIs on the products, services and patents of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.3.22
In terms of the period over which impacts had fed through, the suppliers considered they had supplied the FDIs for a median number of 16 years with an average of around 22. In their view, the length of the relationship provided a firm basis for impacts to feed through.

5.4 Case studies of FDIs and suppliers

5.4.1
A series of case studies were carried out to provide further insights into the nature of impacts. The panels below show the views of FDIs in different sectors, and the views of key suppliers.

Panel 5.1 FDI: Motor vehicle manufacturer

This relatively large inward investor is a major international vehicle manufacturer that located in the UK primarily to access markets in the UK and Europe. It was also attracted by the government's policies on tax and support for business. The European HQ is in the UK, along with manufacturing, distribution, R&D, and sales and marketing. The company has an extensive supplier list, with 50 or more in each of the materials/components and capital goods categories; with over 60 per cent of all suppliers based in the UK – and some mobile to the UK to provide its requirements.

Selection criteria for suppliers are "rigorously" applied. "They need to be efficient and reliable and meet our quality standards". Key points are the willingness to collaborate and get closely involved in design, which is "driven by anticipated customer needs and competitor positioning." Innovation skills are important, along with technology competence and capabilities.

The FDI, with an explicit supplier development strategy, claimed strong impacts on suppliers, and especially in areas where its selection criteria applied. Other areas where arrangements needed to be tightened up, were the validation and operationalisation of technology (often sub-contract tasks as part of a longer process within the context of overall R&D practices).

The stronger impacts were on those supplying materials and components and software associated with how vehicles function, and their control systems.

The key suppliers signed up to the selection criteria used by the FDI and the adjustments they had made. They also improved their innovation management and kept a close eye on the interface with products as the final outputs. They enjoyed the challenges of working with the FDI. The impacts had been well embedded.

The FDI had engaged directly with its suppliers, especially the core ones, on the development of the vehicles as products, its follow-up services to customers, and on manufacturing processes. Direct assistance was comprehensive through joint ventures (the formation of companies with suppliers involving an equity stake and ownership of IP); other development finance was provided for equipment that was dedicated to the FDI, technical assistance, staff training and managerial and organisational assistance. The scale and value of purchases and the contractual tie up provided the "bottom line". A great deal of resourcing went into joint working and integration to ensure quality and dedication, for the benefit of consumers as the primary focus.

The suppliers were very positive towards the joint working and "sharing" culture. For them the technical, management and organisational assistance for innovation were key. They had developed systems to be reviewed by the FDI client on an on-going basis if needed. The suppliers were attracted by the reliable revenue flows, but needed to keep their eye on the overall markets for vehicles. If the market contracted, they needed to be flexible. Hence, their whole business operation could not be dominated by a major customer.

Panel 5.2 FDI: Computing/software development

The market for computer video games has grown considerably over the past decade and become highly competitive world-wide. This FDI supports the development of many games features with its suppliers, from customer easy access to graphics, but not the concepts on the story line – which are "internally driven". The access to EU markets was important for the FDI, along with the unique skills in the UK at the time of its investment.

The supplier network has been rationalised over a number of years to provide a focus on fewer key suppliers – with other one-off sub-contract arrangements for specific tasks, mainly for software development and graphics skills. Half its suppliers are in the UK.

The suppliers are put through a "very thorough" sifting process. Quality, reliability and efficiency underpin this, but these by necessity have to be coupled with computing and software development skills linked to R&D that are state of the art. The level of skills is very important, combined with "entrepreneurial creativity".

The strongest supplier impacts were on R&D, software development skills to fit product concepts and ideas (these were "non-routine"), technological competence/capability and the ability of suppliers to organise their activities effectively. The FDI claimed "strong" impacts on all its suppliers. The impacts were solely on computing suppliers.

The nominated two suppliers interviewed endorsed these impacts, but thought they were "moderate to strong". They believed their skills and competences were pretty high anyway. They had learnt how to collaborate more with the FDI and focus on the outputs for product development rather than just "computing routines".

The FDI had an explicit strategy to develop its suppliers to improve its own products and services, and had formed some joint ventures using equity and debt finance. It had provided assistance and advice on IP (and how to share it). The transmission of good practice for innovation hinged very much on joint working and some staff development (with mentoring – as some suppliers' employees could be "quite young"). It was by necessity underpinned by the value of purchases, the tie-up in contracts and review periods.

The suppliers welcome the joint working practices, which helped to stimulate adjustments, and their ability to meet the FDI requirements. They also highlighted technical assistance. These were just as important as the "business revenue" or the contract arrangements and review mechanisms, which were used by other customers to some degree anyway.

Panel 5.3 FDI: Food processing

This medium-sized FDI from Europe is involved in food processing and supplying the ingredients it produces to other manufacturers, coupled with distribution. They invested in the UK by setting up a new plant, over 15 years ago, to take advantage of the EU market and stimulate growth. Skills were quite important in the relatively rural location it operates from.

It has a wide range of suppliers in R&D, raw materials, capital goods/equipment, but with fewer than 25 in each sector, and less than ten in business services and logistics. Just a quarter are based in the UK, as it brings in ingredients from around the world.

The criteria for selecting suppliers are primarily to do with quality, which is very important in a food sector where fresh produce is key to satisfying the high-quality requirements at all levels of the market. Efficiency and costs were equally important in a sector where margins are tight and outputs could increasingly be sold to major food retailers or producers. Technological competence needed to be used to underpin the reliability required of ingredients and end products.

The main impacts on suppliers (especially in the raw materials – ingredients sub-sectors where speed was needed to get to market and retain freshness) were on their skills to develop their products, technological competence for the internal processing of produce, the ability to recognise the use of technology, a willingness to co-operate especially to reduce costs and improve the efficiency of their operations. There had been strong impacts on about one in ten suppliers, especially for capital goods/equipment, and moderate impacts on one in five.

The key suppliers, who were relatively small, and innovative, having produced new products and processes in the past three years, acknowledged the impact of the FDI. Other strong impacts were on finding technological solutions and helping to develop both products and processes.

The FDI did not have an explicit strategic policy to develop the innovation policies of its suppliers. However, it provided direct technical assistance and advice on procurement from sub-suppliers providing ingredients in the food chain and equipment. Joint working was a key mechanism underpinned by supplier dependency on the sales revenue and income (where margins were tight) and tight contractual arrangements of the quality of ingredients to minimise waste and rejection.

The supplier acknowledged the technical assistance over the six years it had supplied the FDI, and the direct engagement to develop both products and processes. There had also been some staff training in the use of equipment. The value of sales, contractual arrangements and specifications on quality coupled with formal reviews were very important. The food sector required increasingly high standards, and the competition between large clients and new lines were strong.

Panel 5.4 FDI: Environmental and water treatments

This medium-sized company from North America is a relatively new investor in the UK, through acquisition and subsequent expansion, where growth was a main driver, along with the ability to access EU markets where environmental issues were ”increasingly critical” in a wide market of applications in industrial processing, pumping and liquid treatments.

There is a wide supplier group with some three-quarters based in the UK, with most providing components, capital goods and equipment with some R&D. There are some 20 suppliers in these sub-sectors. The company has a strong innovation capability, resulting in significant product and process improvement which is new to the market.

Suppliers are engaged where they meet the “efficiency, cost and quality criteria” and are located within a reasonable distance (i.e. the UK). They need to demonstrate good R&D skills, have strong competences and skills in technology applications (especially for equipment) which are leading edge and “state of the art”. They also need a good knowledge of the market.

The impacts of FDI have been greatest where suppliers tend not to satisfy the initial selection criteria, i.e. on the ability to manage innovation, develop innovation skills related to IP and products, and be willing to collaborate, by operationalising technology.

The impacts were thought to be strong on some one-in-ten suppliers, especially where equipment was required and adapted for the sector, but moderate on the remainder of activities.

The key suppliers recognised these impacts and considered that they had become much more able/willing to collaborate and share knowledge and ideas. The environmental sector and sustainability issues were moving fast, so they had become “lean and adaptable”.

The FDIs did not have an explicit strategic policy to shape their suppliers but did work actively with them at an operational level to improve equipment and processes. There had been a joint venture (with an equity stake and developmental finance) as well as technical assistance. The main mechanism for transmitting good practice was the contractual tie-up which “set the standards”. The scale of purchases and the supplier reviews while recognised were not so important.

The suppliers knew they had to meet the high specifications in the market and were influenced by the FDI requirements. They considered that the joint working and collaborative context was a positive influence on the way they adjusted, especially in improving their components, and their QA arrangements which were made more "exacting and transparent".

5.5 Innovation Impacts: UK-owned businesses and their suppliers

UK-owned businesses

5.5.1
A second question for the research was whether the UK-owned businesses, as with the FDIs, had an impact on the innovation practices of their suppliers. In this section we assess the impact of UK-owned businesses on the innovation practices of their suppliers once they have selected them. **Generally, they did not claim such a high impact on suppliers as the FDIs. However, their suppliers thought the impacts were greater than they did.** We review the same stages of the innovation process used for the FDI analysis above, i.e., general innovation capabilities, R&D skills, technology capability and the development of products/services, processes, and IP.

5.5.2
Less than one in ten UK-owned businesses claimed to have an impact on general innovation practices of their suppliers. The main impacts were the ability and willingness of suppliers to collaborate (10 per cent of businesses); together with impacts on the ability to exchange knowledge/information and develop skills for innovation. The high-tech firms had the strongest impact, with almost one in six claiming positive collaborative impacts, knowledge exchange, and impacts on innovation skills. See Table 5.17.

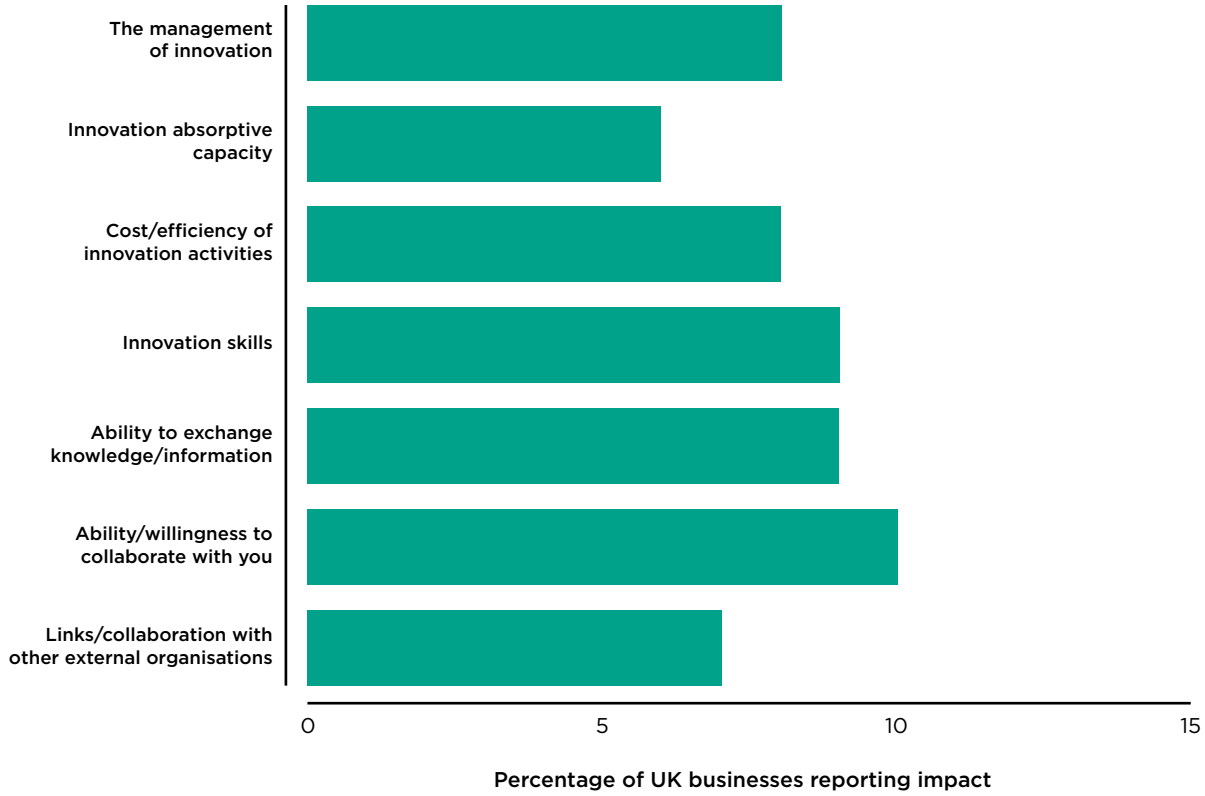
Table 5.17 UK-owned businesses reporting an impact on the innovation capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
The management of innovation	8	5	9	12	8	13
Innovation absorptive capacity	6	1	9	4	6	13
Cost/efficiency of innovation activities	8	3	9	9	8	18
Innovation skills	9	1	12	16	8	13
Ability to exchange knowledge/ information	9	5	10	16	6	18

Ability/willingness to collaborate with you	10	3	14	15	8	18
Links/collaboration with other external organisations	7	3	9	5	5	**18**

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Figure 5.10 UK-owned businesses reporting an impact on the innovation capabilities of their suppliers



Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

5.5.3

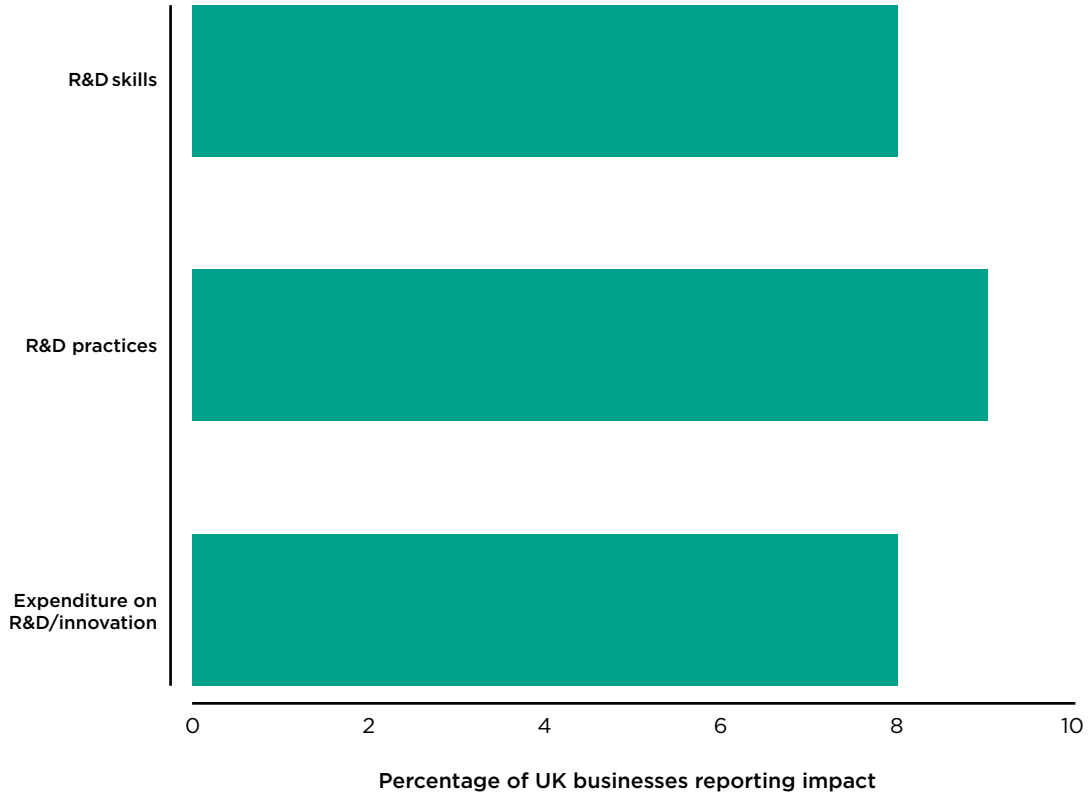
Some 8 per cent of firms claimed to have an impact on the research, development, and design skills and practices of their suppliers. The greatest impacts were claimed by the high-tech and infrastructure sectors. The other sectors identified fewer impacts, with financial services firms claiming slightly higher impacts. See Table 5.18.

Table 5.18 UK-owned businesses reporting an impact on the R&D capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D skills	8	3	9	13	7	13
R&D practices	9	3	10	16	7	13
Expenditure on R&D /innovation	8	3	9	11	8	13

Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Figure 5.11 UK-owned businesses reporting an impact on the R&D capabilities of their suppliers



Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

5.5.4

Just over one in ten firms said they had positive impacts on the technological capability of their suppliers (Table 5.19). This demonstrated some small influence over the absorptive capacity of suppliers, including the ability to identify and operationalise technology. Impacts were higher in the infrastructure, high-tech, and finance sectors. In the infrastructure sector the main impacts, for just over one in six, were on technological competence, the ability to operationalise technology, and the ability to validate technology. In high-tech just under one in six identified impacts on the ability to recognise the

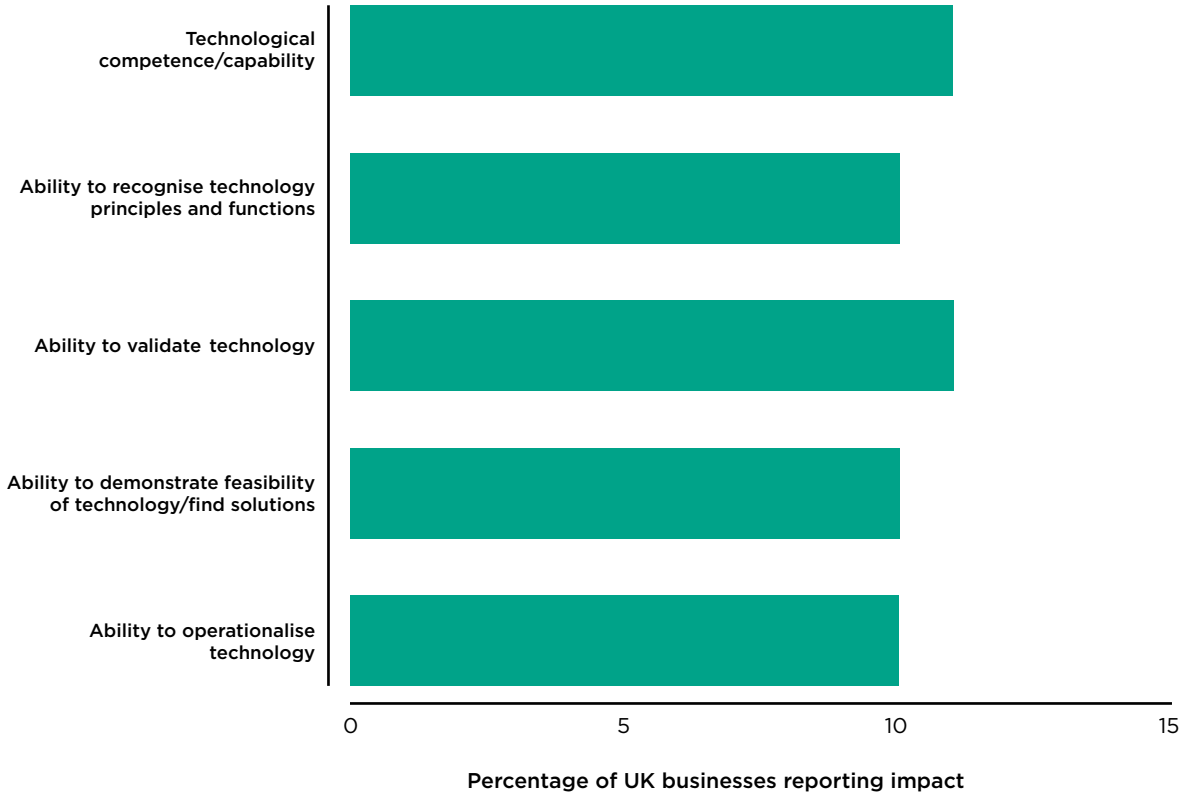
principles and functions of technology and validate them. In financial services the main impacts (again, just under one in six) were on technological competence and the ability to find solutions. The other sectors said the impacts were more likely to be moderate rather than strong.

Table 5.19 UK-owned businesses reporting an impact on the technological capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Technological competence/ capability	11	7	15	14	7	18
Ability to recognise technology principles and functions	10	7	13	15	6	15
Ability to validate technology	11	6	12	15	9	18
Ability to demonstrate feasibility of technology /find solutions	10	6	16	10	4	12
Ability to operationalise technology	10	6	14	11	7	18

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Figure 5.12 UK-owned businesses reporting an impact on the technological capabilities of their suppliers



Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

5.5.5

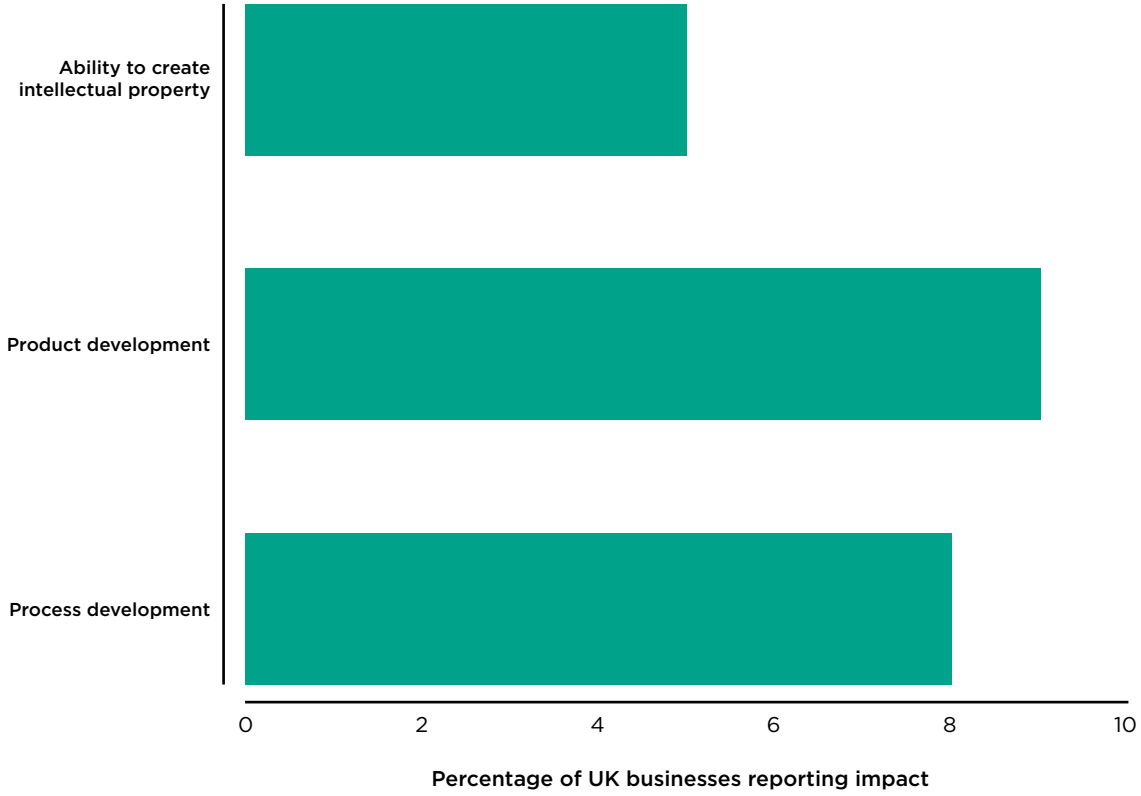
The strongest impacts were on product and process development, claimed by about one in ten businesses, rather than on the ability of suppliers to create intellectual property (one in five). The impacts of the finance, infrastructure, and high-tech sectors were greater, where just over 10 per cent claimed impacts on products and processes. See Table 5.20.

Table 5.20 UK-owned businesses reporting an impact on the intellectual property capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Ability to create intellectual property	5	1	**11**	7	2	5
Product development	9	5	13	10	6	13
Process development	8	5	12	9	5	13

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Figure 5.13 UK-owned businesses reporting an impact on the intellectual property capabilities of their suppliers



Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

5.5.6
Overall, the UK-owned businesses claimed to have had positive impacts on around 8 per cent of their suppliers (with moderate impacts on 6 per cent). The impacts were greater for the high tech sector (i.e., 13 per cent of suppliers), financial services (11 per cent), and infrastructure (10 per cent), with the impacts fairly evenly spread across the other sectors, but with impacts on fewer suppliers.

5.5.7
In terms of types of suppliers where the impacts were strongest, the greatest impact for a fifth of suppliers was on those that provided business services (12 per cent), followed by materials and components (10 per cent) and R&D (9 per cent). The high-tech companies had the highest impact on R&D suppliers (28 per cent), those supplying business services (26 per cent), materials and components (13 per cent). The infrastructure sector claimed higher impacts on suppliers of raw materials/components (with a moderate impact of 23 per cent). The firms in the other sectors claimed the proportion of their suppliers affected was lower.

Suppliers of UK-owned businesses

5.5.8
The suppliers of UK-owned businesses thought the impacts were greater than the latter claimed. However, they thought they were not as great as the impacts that FDIs had on their suppliers. As with the analysis of the impacts as perceived by the UK-owned businesses, the impacts are analysed by general innovation capabilities, R&D and design, technology capabilities, and the impact on products.

5.5.9

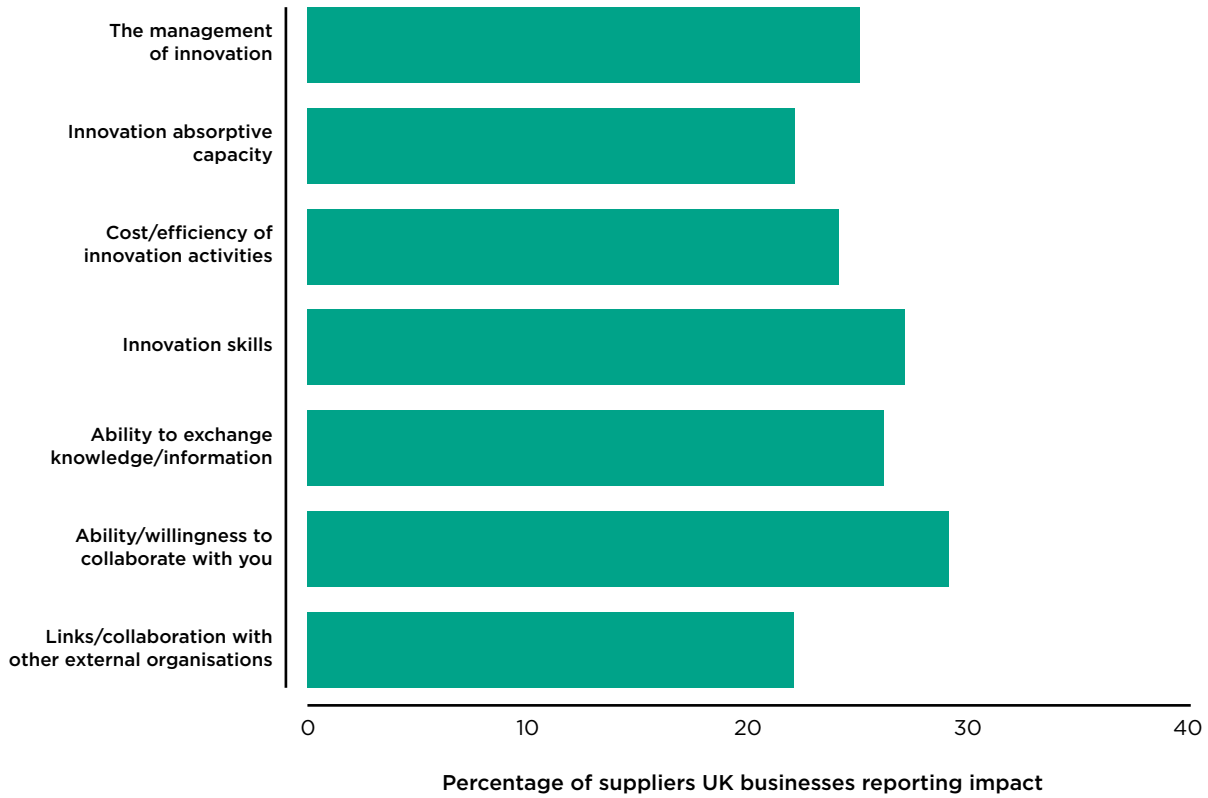
Overall, just over a quarter of suppliers (28 per cent) considered that UK-owned businesses had an impact on their overall innovation practices. The highest impacts were on collaborative activities (29 per cent). Just over a quarter cited an impact on their innovation skills and knowledge exchange (27 per cent and 26 per cent respectively). Around a quarter thought the UK-owned businesses had a positive impact on the management of innovation, and innovation costs/efficiency. A fifth cited impacts on their absorptive capacity and wider collaborative activities (with external organisations and others in the supply chain). Generally for just over one in ten the impacts were strong, and moderate for one in six to seven. See Table 5.21.

Table 5.21 Impact of UK-owned businesses on the innovation capabilities of suppliers

	Percentages of all respondents
	Any impact
The management of innovation	25
Innovation absorptive capacity	22
Cost/efficiency of innovation activities	24
Innovation skills	27
Ability to exchange knowledge/information	26
Ability/willingness to collaborate with you	29
Links/collaboration with other external organisations	22

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.14 Impact of UK businesses on the innovation capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.5.10

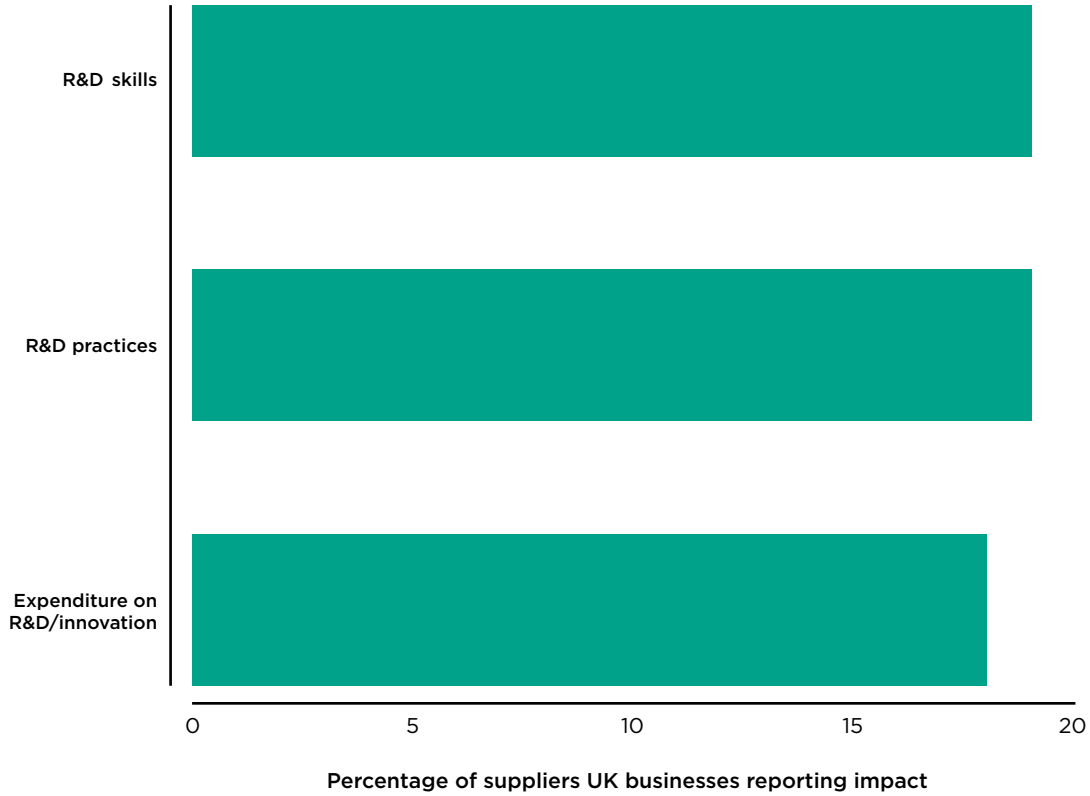
Around a fifth of suppliers said that the UK-owned businesses they supplied had an impact on their R&D and design activities, practices, skills, and increased expenditure on R&D and innovation. See Table 5.22.

Table 5.22 Impact of UK-owned businesses on the R&D capabilities of suppliers

	Percentages of all respondents
	Any impact
R&D skills	19
R&D practices	19
Expenditure on R&D/innovation	18

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.15 Impact of UK-owned businesses on the R&D capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.5.11

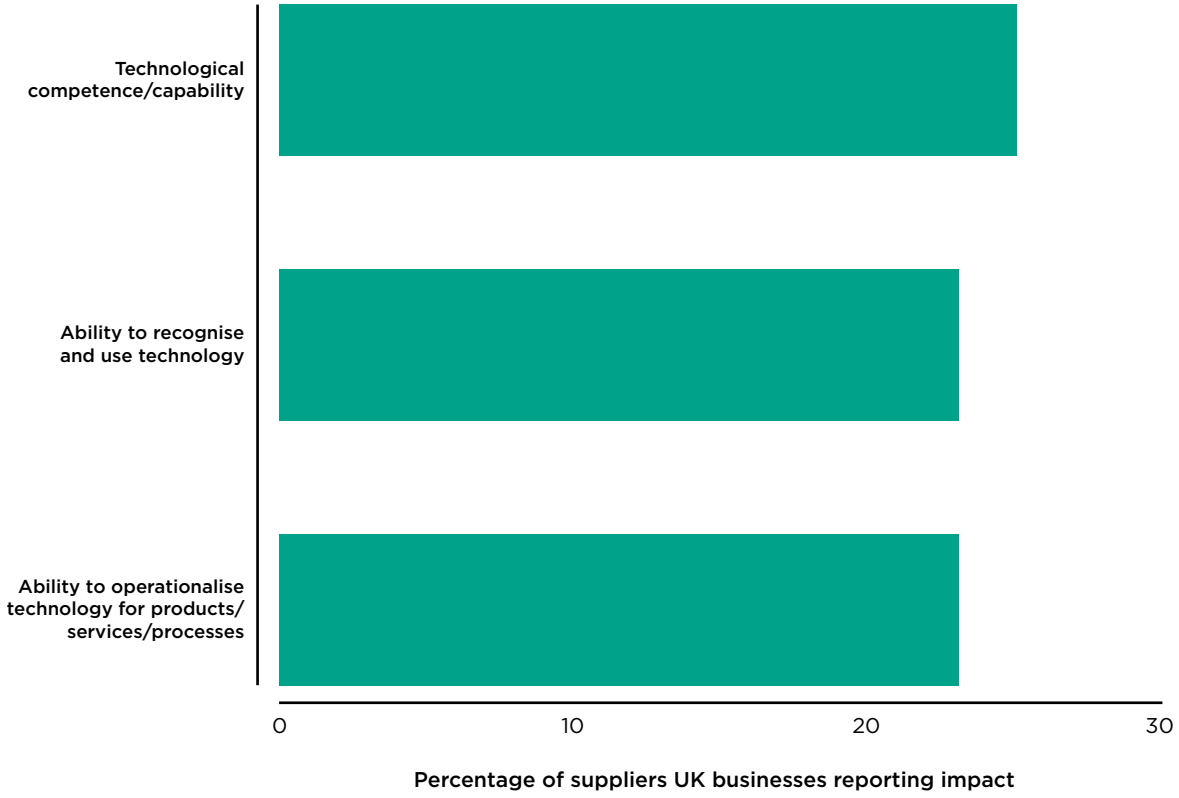
A quarter of suppliers thought that their UK-owned customers had an impact on their technology capabilities and practices (Table 5.23). These included technology competence and capability (25 per cent), the ability to recognise technological practices (23 per cent), and the feasibility of technology solutions and how to operationalise them (23 per cent).

Table 5.23 Impact of UK-owned businesses on the technology capabilities of suppliers

	Percentages of all respondents
	Any impact
Technological competence/capability	25
Ability to recognise and use technology	23
Ability to operationalise technology for products/ services/processes	23

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.16 Impact of UK-owned businesses on the technology capabilities of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

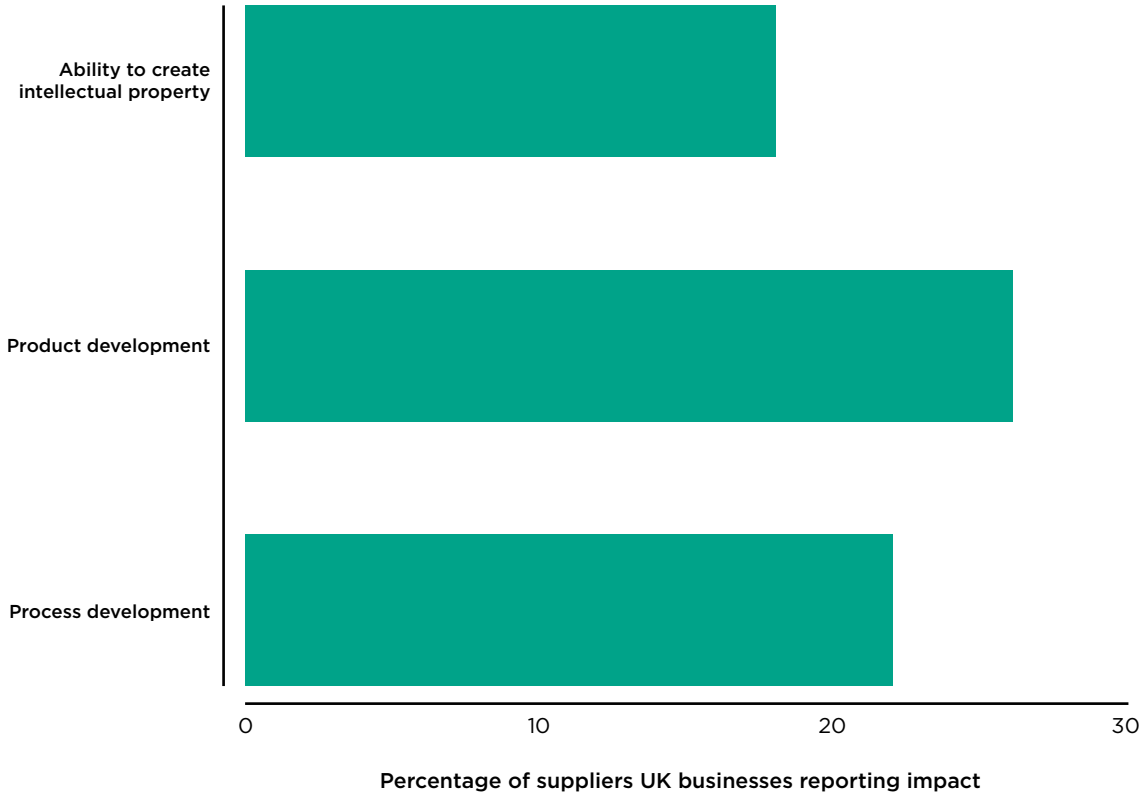
5.5.12
The final stage in the innovation process is the successful launch of products and services and their exploitation. The UK-owned businesses and suppliers share in this process. While just over a fifth of suppliers recognise the influence in terms of creating intellectual property, almost a quarter cited the impacts on process development, and over a quarter (26 per cent) the contribution to direct product development. See Table 5.24.

Table 5.24 Impact of UK-owned businesses on the products, services and patents of suppliers

	Percentages of all respondents
	Any impact
Ability to create intellectual property	18
Product development	26
Process development	22

Source: PACEC Survey of businesses, 2011 (Q8)

Figure 5.17 Impact of UK-owned businesses on the products, services and patents of suppliers



Source: PACEC Survey of businesses, 2011 (Q8)

5.5.13
In terms of the period over which impacts had fed through the suppliers considered they had supplied the UK-owned businesses for a median number of 12 years with an average of around 15.

6 THE MECHANISMS USED TO INFLUENCE SUPPLIERS

6.1.1
To develop the narrative and storyline further, this chapter examines the extent to which the FDIs and UK-owned businesses have a policy to influence the innovation practices of their suppliers, and engage with them to develop products and services. It also compares the FDIs and UK-owned businesses. The research reflects the third stage in the process shown in section 1.2 of the introduction, in that specific steps are taken (such as technical assistance).

6.1.2
The tables and analysis below show the results, with the more detailed tables in Appendix A.

6.2 The summary results

6.2.1
The summary of results panel (below) highlights the policies of FDIs and UK-owned businesses which influence the activities of their suppliers, and the mechanisms they use.

Panel 6.1 The mechanisms used to influence suppliers

An important question was the extent to which FDIs had explicit policies and mechanisms to influence the activities of their suppliers, and whether they place more emphasis on these, compared to UK-owned businesses.

FDIs and their suppliers

Some one in ten FDIs had an explicit strategic policy to develop suppliers' innovation practices. However, there were a series of other mechanisms used:

- Direct Assistance. Both FDIs and their suppliers recognised the direct assistance especially technical assistance. The suppliers were more likely to recognise and respond to the latter as in many cases it was a low-cost support to help them meet the FDI's needs.
- Innovation Transmission Mechanisms. The suppliers were on average three times more likely to acknowledge the influence of contractual arrangements on performance and the sheer value of sales (market opportunities) on their adaptation compared to FDIs. They also placed more emphasis on supplier reviews, staff training and joint working compared to the FDIs.

UK-owned businesses and their suppliers

One in five UK-owned businesses had an explicit strategic policy to develop suppliers' innovation practices, but other mechanisms were also used.

- Direct Assistance. On average the suppliers of UK-owned businesses were twice as likely (although the shares were relatively small) to recognise direct assistance (especially technical assistance).
- Innovation Transmission Mechanisms. Generally the suppliers of UK-owned businesses were twice as likely to acknowledge the role of the mechanisms in influencing their behaviour. In particular the sheer volume of purchases/sales opportunities and the contractual requirements were important.

FDI and UK businesses compared

One in ten of both FDI and one in five UK-owned businesses had a strategic policy to develop the innovation practices of suppliers.

- Direct Assistance. On average the FDI businesses were twice as likely to provide direct assistance (especially technical assistance) to their suppliers compared to UK-owned businesses. However, the proportions of businesses for both groups were relatively small.
- Innovation Transmission Mechanisms. The FDI and UK-owned businesses placed a similar emphasis on the range of mechanisms with both highlighting the contractual arrangements for supplier performance and the scale and value of purchases (with the UK-owned businesses placing slightly more emphasis on the latter).

The suppliers of FDIs and UK-owned businesses

Direct Assistance. The suppliers to FDIs were on average twice as likely to acknowledge the role of direct assistance on their innovation practices compared to the suppliers of UK-owned businesses. This was especially the case with technical assistance as the main direct form.

Innovation Transmission Mechanisms. The suppliers of FDI and UK-owned businesses both recognised the importance of the value of purchases/sales opportunities and contractual obligations to a similar degree with more emphasis placed on them by the FDI suppliers. They were also more likely to recognise the role of supplier reviews, staff development and training and joint working.

Overall, the barriers to adjustments were the cost and availability of finance, and the risks associated with innovation.

6.2.2
The next stage in the analysis is to show the main findings for each group of companies.

6.3 The policies and mechanisms of FDIs

6.3.1
Some one in ten FDIs said they had an explicit strategic policy to develop suppliers' innovation practices, with one in six FDIs in financial services and high-tech citing these policies. However, a quarter did provide direct assistance which reflected their policies, although they did not say it was strategic. A quarter of FDIs also said they had worked closely with their suppliers to develop new or significantly improved practices. This activity was slightly higher for the conventional manufacturing and high-tech businesses sector. Almost a fifth said they had worked with suppliers to develop new or significantly improved processes. Activity was slightly higher in the retail, high-tech and conventional manufacturing sectors.

6.3.2
In terms of direct assistance given by FDIs to improve the innovation practices of suppliers, just over one in ten said they provided technical assistance. The high-tech (in particular), the retail and conventional manufacturing sectors claimed they provided such assistance. The financial services and conventional manufacturing services tended to provide more

information on markets. The conventional manufacturing and high-tech companies provided more staff training and development for their suppliers, and the infrastructure and retail sectors provided greater managerial and organisational assistance. See Table 6.1.

Table 6.1 FDIs: Direct assistance provided to increase the innovation capability/ capacity of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Joint ventures	4	4	5	8	1	4
Information on markets	7	9	10	6	3	4
Technical assistance	13	15	9	21	11	5
Financial assistance	5	3	6	9	2	2
Procurement assistance	4	3	0	6	4	5
Training/staff development	6	9	6	7	6	3
Managerial/organisational assistance	6	6	6	5	7	8
Advice on intellectual property	3	4	0	4	4	2
Other	8	12	10	7	5	2
None	75	72	76	66	81	83
Number of respondents (rate=%)	*496*	*104*	*120*	*99*	*114*	*59*

Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q19)

6.3.3

Further analysis of the data indicated that on the whole, FDIs from the US were the most likely to have provided their suppliers with a wide range of assistance to help them increase their innovation capability. For example, FDIs originating from the US (22 per cent) were almost twice as likely as the rest to have provided technical assistance, information on markets (13 per cent), financial assistance (10 per cent), and staff training and development 10 per cent). FDIs from Germany were notable for providing significant levels of staff training and development (11 per cent) and advice on intellectual property (9 per cent).

6.3.4

It might be expected that the larger FDIs would be the most likely to provide a more varied range of assistance to their suppliers to help them increase their innovation capacity. And this was broadly the case; with the largest FDIs (250+ employees) providing technical assistance (21 per cent), financial assistance (19 per cent), staff training and development (16 per cent), and information on markets and joint ventures (12 per cent each). It was notable, though, that some medium-sized firms provided more procurement (10 per cent) and managerial/organisational assistance (8 per cent).

6.3.5

In terms of the mechanisms used to influence innovation practices, the main ones which were cited as important were contractual arrangements for performance and quality (29 per cent), and the sheer scale and value of purchases (27 per cent). Around a quarter

used joint working techniques and more formal supplier reviews. The distribution of these practices was fairly evenly spread between the conventional manufacturing sector, high-tech, finance and business services, retailing and infrastructure. See Table 6.2.

Table 6.2 FDIs: Mechanisms used for transmitting impacts to suppliers

	Percentages of all respondents						
	Total	Conventional manufacture	Creative industries	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Through the scale/ value of your purchases	27	34	8	29	33	27	20
Contractual arrangements for performance/ quality	29	28	5	36	34	28	30
Supplier reviews	24	25	0	23	32	28	22
Staff development/ training	20	13	1	25	29	23	18
Joint working on design/quality	25	22	7	18	31	35	26
Other mechanisms	6	9	0	2	2	9	10
Number of respondents (rate=%)	*463*	*93*	*38*	*87*	*90*	*98*	*57*

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (q20)

6.3.6

There were considerable differences between FDIs from different countries, with regard to the mechanisms they employed to influence the innovation practices of their suppliers. As has already been noted from other practices, US FDIs, more than those from elsewhere, sought to transmit the impacts of innovation through the main mechanisms identified in the survey. More specifically, two-fifths of the US FDIs (39 per cent) and a third of those from Germany (32 per cent) indicated that they relied on the volume of their purchases. Around a third of FDIs from the US (34 per cent) and Germany (32 per cent) also cited supplier reviews. On the other hand, a third of the FDIs from elsewhere in Europe (33 per cent) relied on contract compliance to influence the innovation practices of suppliers.

6.3.7

The influence of the size of FDIs on suppliers' practices was evident, for the most part, when the mechanisms for transmitting those impacts were considered. The largest FDI businesses were the most likely to exert their influence across the broad range of transmission mechanisms identified. Between two-fifths and half relied on the scale of purchases (47 per cent), contractual arrangements (46 per cent), supplier reviews (45 per cent) and staff training and development (39 per cent). It was notable as well, though, that significantly high proportions of the largest SMEs had similar practices.

6.3.8

In part, FDI businesses work with their suppliers in order to help overcome some of the barriers the suppliers face with respect to innovation. However, the main barriers facing suppliers, based on the perceptions of FDI (i.e. almost one in ten), were the availability and cost of finance (although FDIs do not usually provide finance to alleviate these). Linked to these, the direct innovation costs, which were seen as too high for suppliers (8 per cent). They were greatest in the high-tech sector (i.e., one in seven FDIs). These factors reflect the current financial environment in which the supply of finance to businesses (especially SMEs) is seen as limited. Although interest rates are low, the cost of finance can be associated with the relatively high co-lateral ratios required by lenders. These barriers that suppliers faced can be associated with the perceived risks of investment when using debt finance. FDIs considered that the financial constraints were slightly higher in the retail/ leisure and infrastructure sectors. See Table 6.3.

Table 6.3 FDIs: Barriers which limit UK suppliers from improving their innovation practices

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Excessive perceived economic risks	2	1	1	**6**	4	0
Direct innovation costs too high	8	8	5	13	7	7
Costs of finance	9	3	6	15	11	13
Availability of finance	9	10	3	14	11	10
Lack of qualified personnel/skills	3	3	1	4	7	0
Lack of information on technology	3	0	1	4	**10**	1
Lack of information on markets	2	0	1	2	3	7
Lack of information on business/ innovation support	2	0	1	**7**	0	0
Market dominated by established businesses	4	0	1	5	**10**	0
Uncertain demand for innovative goods or services	3	0	1	6	**7**	0
Need to meet UK Government regulations	4	6	1	6	3	6
Need to meet EU regulations	4	3	1	5	8	1
Other	14	22	12	17	10	7
None	66	59	77	60	67	67
Number of respondents (rate=%)	*487*	*104*	*120*	*94*	*111*	*57*

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q21A)

6.4 The suppliers' views on FDIs and the mechanisms used to influence them

6.4.1
Two in five suppliers of FDIs indicated that they had worked with the FDI to develop products and services, while a third engaged to develop processes.

6.4.2
In terms of direct assistance from the FDIs approximately a third of suppliers acknowledged the assistance. The main source identified was technical assistance cited by around a quarter. The other sources were financial assistance (mentioned by a tenth), through a combination of joint ventures and direct financing. Other types of assistance were recognised by almost one-in-ten, for example, assistance with training/staff development, management/organisational assistance, and procurement assistance. See Table 6.4.

6.4.3
The mechanisms that were seen to influence the innovation practices of suppliers were the sheer scale and value of purchases (i.e., eight out of ten suppliers), and the contractual arrangements/agreements on performance and quality (some two-thirds). Joint working with FDIs on design issues was highlighted by two-fifths of suppliers and supplier reviews and staff training and development by just over a third.

Table 6.4 Suppliers of FDIs: views on mechanisms for transmitting impacts to suppliers

	Percentages of all respondents
Through the scale/value of your purchases	80
Contractual arrangements for performance/quality	72
Supplier reviews	36
Staff development/training	35
Joint working on design/quality	39
Other mechanisms	11

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of suppliers, 2012 (q20)

6.4.4
The main barriers to innovation were seen as the cost and availability of finance identified by one in five suppliers. The direct costs of innovation and a lack of skilled staff by some one in ten, a small but significant proportion. The other main issues were UK government and EU regulations, raised by about 10 per cent. Some four in ten suppliers identified barriers in some form. See Table 6.5.

Table 6.5 Barriers which limit suppliers of FDIs from improving their innovation practices

	Foreign
Excessive perceived economic risks	2
Direct innovation costs too high	11

Costs of finance	21
Availability of finance	15
Lack of qualified personnel/skills	8
Lack of information on technology	3
Lack of information on markets	3
Lack of information on business/innovation support	0
Market dominated by established businesses	4
Uncertain demand for innovative goods or services	5
Need to meet UK Government regulations	9
Need to meet EU regulations	8
Other	11
None	58

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of businesses, 2011 (Q14)

6.5 The Policies and Mechanisms of UK-owned Businesses

6.5.1

Almost one in ten UK-owned businesses said they had an explicit strategic policy to develop suppliers' innovation practices, with one in four in high-tech citing these policies. One in six firms said they had worked closely with their suppliers to develop new or significantly improved products. This activity was higher for the high-tech businesses sector (28 per cent) and firms in infrastructure (23 per cent). Almost one in seven said they had worked with suppliers to develop new or significantly improved processes. Activity was higher in the high-tech and infrastructure sectors where a quarter worked with their suppliers.

6.5.2

In terms of direct assistance given by UK businesses to improve the innovation practices of suppliers, just under one in ten said they gave technical assistance. The high-tech and infrastructure sectors claimed to provide more technical assistance, compared to the other sectors. See Table 6.6.

Table 6.6 UK-owned businesses: direct assistance provided to increase the innovation capability/capacity of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Joint ventures	3	0	2	6	5	0
Information on markets	3	0	4	2	6	0
Technical assistance	7	3	9	15	3	13
Financial assistance	2	0	2	2	2	5
Procurement assistance	3	0	5	6	2	0
Training/staff development	1	0	3	2	1	0

Managerial/organisational assistance	2	0	3	8	0	0
Advice on intellectual property	1	0	0	6	0	0
Other	3	4	3	3	0	9
None	89	92	88	85	90	87

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of UK-owned businesses, 2012 (Q16)

6.5.3

In terms of the mechanisms used to influence innovation practices, the main ones cited which were seen as important were contractual arrangements for performance and quality (28 per cent), and the sheer scale and value of purchases (32 per cent). Around one in six used joint working techniques, staff development/training, and more formal supplier reviews (20 per cent). The distribution of these practices was more pronounced, especially in high-tech and for the retailing and infrastructure sectors. See Table 6.7.

Table 6.7 UK-owned businesses: mechanisms used for transmitting impacts to suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Through the scale/value of your purchases	32	22	27	35	36	40
Contractual arrangements for performance/quality	28	21	20	44	37	25
Supplier reviews	20	12	17	33	27	14
Staff development/training	16	12	14	22	23	15
Joint working on design/quality	16	16	16	16	17	15
Other mechanisms	6	2	5	5	12	11

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of UK-owned businesses, 2012 (q17)

6.5.4

In part UK-owned businesses work with their suppliers in order to help overcome some of the barriers the suppliers face with respect to innovation. The main barriers facing suppliers, based on the perceptions of UK businesses, were the availability and cost of finance (almost one in five UK businesses for each of these factors). Linked to these, the direct innovation costs, which were seen as too high for suppliers (13 per cent). They were greatest in the high-tech, conventional manufacturing, and retail sectors (i.e., one in four). These factors reflect the current financial environment in which the supply of finance to businesses (especially SMEs) is seen as limited. Although interest rates are low, the cost of finance can be associated with the relatively high co-lateral ratios required by lenders. These barriers that suppliers faced can be associated with the perceived risks of investment when using debt finance. Firms in the conventional manufacturing sector (21 per cent) also considered that the market was dominated by established businesses which contracted suppliers. In high-tech, the main constraint was the uncertain demand for innovative goods and services (a quarter of firms). See Table 6.8.

Table 6.8 UK-owned businesses: barriers which limit suppliers from improving their innovation practices

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Excessive perceived economic risks	1	1	1	0	2	0
Direct innovation costs too high	13	17	9	22	16	0
Costs of finance	18	22	11	24	20	18
Availability of finance	19	25	12	23	19	18
Lack of qualified personnel/skills	11	**21**	7	6	14	0
Lack of information on technology	5	2	3	18	4	0
Lack of information on markets	1	4	1	0	0	0
Lack of information on business/ innovation support	2	0	3	8	0	0
Market dominated by established businesses	9	**21**	4	2	9	5
Uncertain demand for innovative goods or services	5	0	4	25	2	0
Need to meet UK Government regulations	10	9	7	8	13	20
Need to meet EU regulations	3	0	2	0	6	10
Other	7	4	5	10	9	10
None	70	65	**83**	62	65	67

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of UK-owned businesses, 2012 (Q18)

6.6 The suppliers' views on the mechanisms UK-owned businesses used to influence them

6.6.1
With respect to joint working and engagement with UK-owned businesses, a quarter of suppliers worked on products and services, and a third on processes.

6.6.2
In terms of direct assistance from the UK-owned businesses approximately a quarter of suppliers acknowledged some form of interaction. The main source identified was technical assistance cited by around one-in-six. The other sources were financial assistance, information on markets, training/staff development, and management assistance, cited by one in twenty for each. See Table 6.9.

6.6.3
The mechanisms that were seen to influence the innovation practices of suppliers were the sheer scale and value of purchases (i.e., two-thirds), and the contractual arrangements/ agreements on performance and quality (some six in ten). Joint working with UK-owned

businesses on design issues, supplier reviews and staff training and development were identified by a fifth to a quarter of suppliers.

Table 6.9 Suppliers of UK-owned businesses: mechanisms for transmitting impacts to suppliers

	Percentages of all respondents
Through the scale/value of your purchases	65
Contractual arrangements for performance/quality	59
Supplier reviews	24
Staff development/training	21
Joint working on design/quality	23
Other mechanisms	4

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of UK-owned businesses, 2012 (Q13)

6.6.4

The main barriers to innovation were seen as the cost and availability of finance identified by one in six suppliers. The other barriers were that direct innovation costs were too high (11 per cent), there was uncertain demand for innovative goods and services, and there were difficulties meeting UK government requirements – almost one in ten suppliers for each barrier. One in twenty mentioned a lack of skills, information on business support for innovations and difficult EU regulations. Overall a third of suppliers identified barriers in some form. See Table 6.10.

Table 6.10 Barriers which limit suppliers of UK-owned businesses from improving their innovation practices

	Percentages of all respondents
	UK
Excessive perceived economic risks	3
Direct innovation costs too high	11
Costs of finance	14
Availability of finance	14
Lack of qualified personnel/skills	6
Lack of information on technology	4
Lack of information on markets	3
Lack of information on business/innovation support	**5**
Market dominated by established businesses	1
Uncertain demand for innovative goods or services	7
Need to meet UK Government regulations	7
Need to meet EU regulations	5
Other	7
None	**69**

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of businesses, 2011 (Q14)

7 REGRESSION ANALYSIS

7.1 Introduction

7.1.1
The aim of this chapter is to examine whether foreign direct investment into a firm is a statistically significant influence on the innovation impacts of firms upon their suppliers, and other characteristics of firms such as their propensity to innovate. The statistical analysis uses the survey data to control for other factors influencing performance (such as size and industrial sector) and examine whether these controls explain the findings from the descriptive analysis.

7.1.2
The survey samples of FDI companies and UK companies were designed so as to be directly comparable in terms of their size and industrial sector. The analysis presented so far in this report appears to show that the FDI firms have greater impacts upon the innovation capabilities of their suppliers than indigenous UK companies. However, the sample design has not taken account of other potentially relevant factors such as the age of firms and the mix of activities which they carry out in the UK, which were not known prior to the interviews and did not form part of the survey quota strategy.

7.1.3
In order to test the theory that FDI companies are more likely to have innovation impacts upon their suppliers, we have built a statistical model, based upon the information known about the indigenous and FDI companies, using logistic regression. This model predicts the odds of any company reporting impacts upon its suppliers according to the questions in the survey. The odds of a company (with certain characteristics) having an impact is equal to the probability of it having an impact divided by the probability of it not having an impact. For example, if the probability of a certain company having an impact is 80 per cent, the associated odds are 4 (=80/20) to 1.[8]

7.1.4
The model we create allows us to calculate the difference each characteristic of a company makes to the odds of each impact. For example, if by changing one characteristic to the company in the previous paragraph, the probability of the company having an impact changes to 75 per cent, the associated odds change to 3 (=75/25) to 1. The effect of that one characteristic has changed the odds by a multiplier of 0.75 (=3/4). Therefore odds ratios of greater than 1 indicate an increased likelihood of impact (or whatever other dependent variable is being used), and odds ratios of less than 1 indicate a decreased likelihood of impact. The bigger the odds ratio, the bigger the change to the likelihood of impact. It is these odds ratios which we report on in the following tables.

7.1.5
The four business characteristics which were modelled were as follows:

- Likelihood of any impact upon the innovation activities of suppliers (strong or moderate).
- Likelihood of having innovated in the past three years.
- Likelihood of having provided direct innovation capability or capacity assistance to suppliers.
- Likelihood of having used innovation criteria in selection of suppliers.

7.1.6
The variables tested for their influence upon the supplier impacts were as follows:

- Whether the company was foreign-owned or not.
- Industrial sector of company.
- Age of company.
- Size of company.
- Innovations in the last three years: products/services, processes, registered IP.
- Criteria for supplier selection: general business practices, R&D factors, innovation, technological.
- Explicit strategy or policy to develop suppliers' innovation practices.
- Collaboration with other organisations on innovation and technology issues.
- Forms of direct assistance provided to suppliers:
  - Joint ventures.
  - Market information.
  - Technical assistance.
  - Financial assistance.
  - Procurement assistance.
  - Training/staff development.
  - Managerial/organisational assistance.
  - Advice on intellectual property.

7.2 Regression results

7.2.1
FDI companies have 1.8 times greater odds of claiming an innovation impact upon their suppliers than UK companies. Those companies that were carrying out R&D activities in the UK, using general and innovation-based supplier selection criteria, and providing direct innovation capability or capacity assistance to suppliers were more likely to report having had innovation impacts upon their suppliers. These characteristics are most strongly associated with increasing the likelihood of innovation impacts.

7.2.2
A fuller set of regression models, investigating individual types of impact, can be found in Appendix C.

Table 7.1 Impact (any)

	Model results	
	Significance	Odds ratio
FDI	2.9%	1.8
R&D activities in the UK	0.0%	2.9
Innovation: introduced new products/services in last three years	2.7%	1.8
Supplier selection criteria: general	0.0%	4.4
Supplier selection criteria: innovation	0.1%	3.6
Supplier selection criteria: technology	2.5%	2.2
Explicit strategy/policy to develop suppliers' innovation practices	1.2%	3.6
Collaborates on innovation/technology issues	4.4%	1.7
Has provided direct innovation capability/capacity assistance to suppliers	0.0%	9.1
Constant term	*0.0%*	0.0

Source: PACEC

7.2.3

FDI companies have 1.8 times greater odds of having innovated in the past three years (introducing new products, services, processes, or applying for/registering IP). Those companies that were carrying out R&D activities in the UK, that had an explicit strategy or policy to develop suppliers' innovation practices, that collaborated with other organisations on innovation or technology issues, and that provided direct innovation capability or capacity assistance to their suppliers were the most likely to have innovated in the past three years. These characteristics are most strongly associated with increasing the likelihood of innovation.

7.2.4

Those companies that had introduced new processes in the last three years; using supplier selection criteria concerning innovation; had an explicit strategy or policy to develop suppliers' innovation practices; and collaborated with other organisations on innovation

Table 7.2 Innovation in past three years (any)

	Model results	
	Significance	Odds ratio
FDI	0.1%	1.8
Founded or FDI invested within last ten years	4.1%	1.4
R&D activities in the UK	0.0%	2.9
Supplier selection criteria: general	5.8%	2.4
Explicit strategy/policy to develop suppliers' innovation practices	0.8%	2.5
Collaborates on innovation/technology issues	0.0%	1.6
Has provided direct innovation capability/capacity assistance to suppliers	0.0%	5.6
Constant term	*0.1%*	*0.2*

Source: PACEC

and technology issues were more likely to have provided direct innovation capability or capacity assistance to their suppliers. Foreign ownership had no direct impact upon the likelihood of companies to have provided direct innovation capability or capacity assistance to their suppliers. This finding stands in opposition to the raw statistics from the survey research, which showed that 25 per cent of FDIs and 11 per cent of UK companies had provided assistance. The regression result therefore shows that the difference between FDIs and UK companies is explained by some combination of the other significant factors: FDIs provide more assistance as a result of their greater innovation, collaboration on innovation/technology issues, likelihood of having an explicit policy to develop suppliers' innovation practices, or some combination of the driving factors set out above.

7.2.5

FDI companies have 0.5 times the odds of indigenous companies of using innovation criteria in their selection of suppliers – i.e. they were less likely than UK companies to do so. Those companies that were conducting R&D activities in the UK, that had an explicit

Table 7.3 Direct innovation capability/capacity assistance to suppliers

	Model results	
	Significance	Odds ratio
Industry: high-tech	8.6%	1.7
Innovation: introduced new products/services in last three years	3.1%	2.1
Innovation: introduced new processes in last three years	0.2%	2.7
Over 25 per cent of UK suppliers are foreign-owned	5.6%	1.9
Supplier selection criteria: general	5.3%	2.1
Supplier selection criteria: R&D	3.0%	2.3
Supplier selection criteria: innovation	0.3%	2.8

Explicit strategy/policy to develop suppliers' innovation practices	0.0%	13.1
Collaborates on innovation/technology issues	0.0%	3.0
Constant term	0.0%	.0

Source: PACEC

strategy or policy to develop suppliers' innovation practices, and that provided direct innovation capability or capacity assistance to their suppliers, were more likely to use innovation criteria in their supplier selection. These characteristics are most strongly associated with increasing the likelihood of innovation.

7.3 Summary

7.3.1

The results of the regression analysis were as follows:

- FDI companies were more likely than indigenous companies to claim innovation impacts upon their suppliers.
- FDI companies were more likely than indigenous companies to have innovated in the past three years.
- Independently of other key characteristics such as strategies, policies, and levels of innovation, FDI companies were no more likely than indigenous companies to have provided direct innovation capability or capacity assistance to their suppliers.
- FDI companies were less likely than indigenous companies to have used innovation criteria in their selection of suppliers.

7.3.2

In addition to the FDI or indigenous status of companies, the characteristics associated with innovation impacts are as follows:

- Provision of direct assistance to suppliers (various forms).
- Conducting R&D in the UK.
- Developing new processes (all impacts) or products/services (particularly for strong impacts) in the last three years.
- Supplier selection criteria: general business practices, innovation criteria, or technology criteria.
- Having an explicit strategy or policy to develop the innovation practices of suppliers.
- Introducing new products or services in the last three years.
- Collaboration with other organisations on innovation and technological issues.

8 THE WIDER IMPACT ON INNOVATION

8.1.1
While the FDIs have an impact on the innovation practices of their immediate suppliers, they can potentially have a wider influence on the innovation system. This is defined as the interaction between the different phases in the innovation system to transfer knowledge, collaborate and move innovation forward in trading relationships. A conceptual diagram of the innovation system is set out in Figure 8.1 below.

Figure 8.1 The innovation system

Source: PACEC

8.2 The summary results

8.2.1
The FDIs and UK-owned businesses both engage with the innovation system. Panel 8.1 shows their interactions.

Panel 8.1 The summary of results

FDIs and UK-owned businesses, and their suppliers, interact to some extent with the wider UK innovation system, including the business forums/networks, research organisations, consultancies and universities. The interaction can be informal or through contracts for goods and services.

- Generally, the FDIs and UK-owned businesses had similar levels and ways of interacting with the system, but the former had more interaction with universities.
- The suppliers of FDIs and UK-owned businesses had different levels of interaction, with the former being twice as likely to engage, especially with business networks, universities, and research and technology businesses. Hence they are more outward-looking and arguably more likely to convey their innovation practices or those of the FDIs to the innovation system.

8.3 FDIs: Wider impact on innovation

8.3.1
The FDIs were asked to describe their degree of collaboration with the main organisations in the wider innovation system, and the extent to which they collaborated to address innovation and technology issues, and exchange knowledge. The main types of collaboration for around a fifth of FDIs were with their customers and other businesses and plants/sites in their group of companies. For just over a tenth, there was collaboration with other businesses, largely in the same sector, and with universities and research institutions acting mainly as advisers on issues or collaborations on projects. Just under a tenth of FDIs engaged with business networks and forums (primarily to exchange knowledge), or with research and technology businesses or consultancies who mainly acted as sub-contractors on innovation and research issues. Some one in six FDIs collaborated with government support organisations, primarily to obtain advice, and in some cases to seek finance for innovation.

8.3.2
In the high-tech sector the collaboration tended to be higher, especially with research and technology businesses, universities, and consultancies. See Table 8.1.

Table 8.1 FDIs: Collaboration with other organisations on innovation/technology issues

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Businesses/plants in your group	19	25	14	18	21	14
Research and technology businesses	8	9	3	**17**	8	5
Your customers	21	22	20	21	22	21
Universities/research institutions	12	10	8	**20**	13	4
Consultancies	7	8	3	13	5	9
Other businesses	12	11	10	15	9	19
Business networks/forums	9	14	5	9	10	8
Government support organisations	15	16	20	18	12	8
None of these	52	53	44	47	60	57

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select several options; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q22A)

8.3.3

Overall, the interaction with the innovation system was fairly broadly based, in terms of the range of organisations engaged. The high-tech businesses were probably the most externally facing, collaborating with the government sector, universities (research institutes, other businesses, research and technology businesses and consultancies), more than found compared to the other sectors (i.e. between 9 per cent and 15 per cent of FDI high-tech businesses). The conventional manufacturing sector was the second most externally facing sector to a small degree, compared to the other sectors.

8.4 FDI Suppliers: The wider impacts on innovation

8.4.1

As with the FDIs, the suppliers were asked the extent to which they engaged with the wider innovation system. Overall almost half had collaborative interactions on innovation issues. The primary innovation was with customers including the FDIs (27 per cent of suppliers), followed by interactions with other businesses and business networks and forums (around a fifth for each). Some one in six engaged with businesses and other sites in their group, or with universities and research institutions. Some one in ten engaged with research and technology businesses or consultancies. See Table 8.2.

Table 8.2 Suppliers of FDIs: Collaboration with other organisations on innovation/ technology issues

	Percentages of all respondents
	Foreign
Businesses/plants in your group	**16**
Research and technology businesses	**9**
Your customers	**27**
Universities/research institutions	**15**
Consultancies	10
Other businesses	**19**
Business networks/forums	17
Government support organisations	4
None of these	**53**

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of businesses, 2011 (Q15)

8.5 UK-owned businesses: The wider impact on innovation

8.5.1
While the FDIs have an impact on the innovation practices of their immediate suppliers, they can potentially have a wider influence on the innovation system. This is defined as the interaction between the different phases in the innovation system to transfer knowledge, collaborate and move innovation forward in trading relationships, as set out in Figure 8.1 previously.

8.5.2
The UK-owned businesses were asked to describe their degree of collaboration with the main organisations in the wider innovation system, and the extent to which they collaborated to address innovation and technology issues, and exchange knowledge. The main types of collaboration for around a fifth of FDIs were with their customers and other businesses. For just over a tenth, there was collaboration with business networks and forums and consultancies. Just under a tenth interacted with universities and research institutions. There was little collaboration with government support organisations. The high-tech sector participated most in the innovation system, with some 28 per cent engaging with research and technology businesses and a fifth to a quarter with consultancies and universities. See Table 8.3.

Table 8.3 UK-owned businesses: Collaboration with other organisations on innovation/ technology issues

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, hospitality	Misc. infras-tructure
Businesses/plants in your group	6	3	5	4	**13**	5
Research and technology businesses	7	4	7	28	**1**	5
Your customers	20	18	28	7	24	15
Universities/research institutions	7	1	8	**20**	7	5
Consultancies	10	8	9	**24**	6	13
Other businesses	15	8	22	20	11	15
Business networks/forums	11	**1**	**24**	9	9	10
Other support organisations	4	0	6	5	1	13
None of these	67	77	60	51	69	77

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of UK-owned businesses, 2012 (Q19)

8.6 Suppliers to UK businesses: The wider impacts on innovation

8.6.1

As with the suppliers of FDIs, the suppliers of UK-owned businesses were asked the extent to which they engaged with the wider innovation system. Overall a quarter had collaborative interactions on innovation issues (Table 8.4). The primary engagement was with customers and business networks/forums (just over a tenth of suppliers), followed by interactions with other businesses. Very few engaged with universities and research institutions, or consultancies.

Table 8.4 Suppliers of UK businesses: Collaboration with other organisations on innovation/technology issues

	Percentages of all respondents
	UK
Businesses/plants in your group	**5**
Research and technology businesses	**3**
Your customers	**11**
Universities/research institutions	**6**
Consultancies	6
Other businesses	**7**
Business networks/forums	11
Other support organisations	4
None of these	**74**

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of businesses, 2011 (Q15)

9 CONCLUSIONS

9.1 Introduction

9.1.1
This chapter brings together the main results from the previous chapters on innovation impacts to provide an overview. In summary, it compares the views of FDI businesses to those of their suppliers with a similar analysis of UK-owned businesses and their suppliers. It then draws out differences between the FDIs and the UK-owned businesses and their respective suppliers.

9.1.2
The final section draws out some general conclusions against the study aims.

9.2 Overview of the impacts

9.2.1
The FDIs have a recognisable impact on the innovation activities of their suppliers. While one in five FDIs cited impacts on the innovation activities of suppliers, between one-third and half of suppliers claimed to make adjustments. The impacts were greatest in terms of general innovation capabilities (especially the willingness to collaborate, exchange knowledge, and the development of innovation skills), followed by technology, product development and R&D skills.

9.2.2
The UK-owned businesses have some impact on the practices of their suppliers. Some one in ten UK-owned companies cited impacts on the innovation activities of suppliers, compared to a fifth to a quarter of suppliers who claimed to make adjustments. The key areas in the innovation process where adjustments were higher were the willingness to collaborate, exchange knowledge and innovation skills (as with the FDIs and their suppliers above – but the number of firms was smaller). There were also impacts, but to a similar degree, on technology capabilities, R&D skills and practices, and process development.

9.2.3
Table 9.1 (below) and Section 9.3, show the differences between FDIs and UK-owned businesses and their suppliers. The FDIs generally have stronger impacts compared to the UK-owned businesses, and this view is underpinned by the respective views of their suppliers.

9.2.4
The regression analysis in Appendix C shows that FDI businesses were more likely than UK businesses to have impacts upon their suppliers' ability to collaborate with them, and more likely to have strong impacts upon their R&D skills. These impacts are independent of a wide range of other explanatory factors including company size, industry, activities, criteria for supplier selection, policies, and favoured methods of direct assistance.

Table 9.1 Factors cited as having strong or moderate impacts on the innovation capabilities of suppliers

	FDI businesses	Suppliers to FDI businesses	UK businesses	Suppliers UK to businesses only
The management of innovation	17	34	8	25
Innovation absorptive capacity	17	35	6	22
Cost/efficiency of innovation activities	16	37	8	24
Innovation skills	19	39	9	27
Ability to exchange knowledge/ information	19	42	9	26
Ability/willingness to collaborate with you	24	47	10	29
Links/collaboration with other external organisations	17	35	7	22
R&D skills	18	32	8	19
R&D practices	16	33	9	19
Expenditure on R&D/innovation	12	30	8	18
Technological competence/capability	20	37	11	25
Ability to recognise technology principles and functions	17	37	10	23
Ability to validate technology	16	-	11	-
Ability to demonstrate feasibility of tech/find solutions	17	-	10	-
Ability to operationalise technology	16	38	10	23
Ability to create intellectual property	11	26	5	18
Product development	17	39	9	16
Process development	17	34	8	22

Source: PACEC Surveys of Inward Investors, Indigenous Companies, and their Suppliers, 2012

9.3 Regression analysis

9.3.1

A set of statistical models were built to test the theory that foreign direct investment into a firm is a significant influence upon the innovation impacts of firms upon their suppliers, independently of other factors such as their industrial sector, the activities they carry out in the UK, their size, and their age.

9.3.2

The results of the regression analysis were as follows:

- FDI companies were more likely than indigenous companies to claim innovation impacts upon their suppliers.
- FDI companies were more likely than indigenous companies to have innovated in the past three years.
- FDI companies were not intrinsically more likely than indigenous companies to have provided direct innovation capability or capacity assistance to their suppliers – their increased likelihood of having done so is explained by other factors such as their greater innovation and supplier engagement policy.
- FDI companies were less likely than indigenous companies to have used innovation criteria in their selection of suppliers.

9.3.3
In addition to the FDI or indigenous status of companies, the key drivers of innovation impacts are as follows:

- Provision of direct assistance to suppliers (various forms).
- Conducting R&D in the UK.
- Developing new processes (all impacts) or products/services (particularly for strong impacts) in the last three years.
- Supplier selection criteria: general business practices, innovation criteria, or technology criteria.
- Having an explicit strategy or policy to develop the innovation practices of suppliers.
- Introducing new products or services in the last three years.
- Collaboration with other organisations on innovation and technological issues.

9.4 General conclusions

9.4.1
This section draws out some conclusions reflecting the study aims shown in the introduction.

a) Innovation improvements that take place amongst suppliers, and are required by FDIs

9.4.2
Improvements made by the suppliers to their innovation practices in response to the FDIs are across the whole innovation process for around a quarter to a third. The main adjustments were the willingness to collaborate, exchange knowledge, and improvements to innovation skills. Suppliers also improve their technological competence and capabilities which ultimately contribute to the development of both products and processes.

9.4.3
These adjustments reflect the criteria used by FDIs to select their suppliers. While the focus is on general business capabilities such as efficiency, cost effectiveness and quality, they also look for the ability to manage the innovation process and collaborate with them as well as R&D skills and technology competence.

b) The innovation capacity of suppliers and the location decisions of FDIs

9.4.4
The vast majority of FDIs choose to locate in the UK to take advantage of both UK and EU markets to help meet their growth ambitions. Around one in eight do take account of the innovation capabilities of suppliers in the UK as well as the innovation culture and practices amongst other organisations (including the universities and research bodies). This feature is ranked fourth as an influence on location along with the labour and skills in the UK workforce and is more important than, for example, the transport infrastructure and general government policies.

c) The criteria FDIs use to select suppliers and the role of innovation criteria

9.4.5
The main focus is on the cost effectiveness and efficiency of suppliers and their ability to meet the standards and quality required by FDIs. Customers also look for the ability to manage the innovation process and collaborate with them as well as R&D skills and technology competence.

d) The circumstances in which supplier innovation improvements take place and the intentional actions by FDIs and suppliers

9.4.6
At one level the suppliers make adjustments to their innovation practices as they seek to meet the selection criteria of the FDIs i.e., the willingness to collaborate, manage the innovation process and show they are competent in the relevant technology areas and contribute R&D skills that lead to product/process improvements. They also need to satisfy the requirements of the FDIs in terms of efficiency, costs, quality and standards.

9.4.7
A key driver cited by most suppliers and FDIs which stimulates change and adjustment is the monetary value of actual and potential contracts linked to the contractual tie up on the specification and quality of outputs for FDIs.

9.4.8
Other important factors that stimulate change are the policies of the FDIs to encourage this. While just one in ten had an explicit strategic policy half provided direct assistance to their suppliers. This mainly involved technical assistance focusing primarily on technology issues and its adaptation for products and processes. The other main methods (apart from the contractual arrangements) were joint working and collaboration on innovation and design issues, linked to supplier reviews.

e) The differences between FDIs and UK-owned businesses

9.4.9
The FDIs were twice as likely as the UK-owned businesses to claim impacts on the innovative activities of their suppliers (for all stages of the innovation process from its management, through R&D, technology solutions/feasibility to products and process development). The main differences were the higher impacts of FDIs on the innovation management of their suppliers (and their willingness to collaborate), the positive changes to R&D skills and practices, the ability of suppliers to develop and apply technologies, and the positive impacts on products, services and processes.

9.4.10
The suppliers of FDIs were generally twice as likely to acknowledge the impacts of the FDIs compared to those of UK-owned businesses. The main differences were the impacts of FDIs on innovation management practices, collaboration and knowledge exchange, the adjustments to R&D practices, the development and application of technologies and the ultimate improvements to products and processes (for both the suppliers and the FDIs).

9.4.11
Overall the impact of FDIs was greater than UK-owned businesses. The above conclusions have some key implications for policymakers in seeking to encourage adjustments amongst suppliers both to help attract FDIs to the UK and helping to ensure they remain and improve their competitiveness. Supplier readiness is an important issue where FDI mobility is declining. However, there were barriers to innovation mainly concerned with the availability and cost of finance and the risk associated with innovation where the pay-off was uncertain.

APPENDIX A TABLES

A1 FDI Impact on suppliers: Country and size of FDIs

Table A1.1 FDIs: Types of suppliers for different goods/services in the UK

	Percentages of all respondents					
	Total	Conventional Manufacture Creative industries	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastructure
0-25	98	97	100	99	95	100
26-50	1	0	0	1	3	0
50+	1	3	0	0	2	0
Raw materials/components						
0-25	86	77	99	82	80	96
26-50	4	9	1	6	4	1
50+	9	14	0	12	16	4
ICT, computing, software						
0-25	95	97	95	95	90	100
26-50	2	3	5	1	0	0
50+	3	0	0	4	10	0
Capital goods/equipment						
0-25	95	91	95	92	99	97
26-50	2	3	5	0	0	2
50+	3	7	0	7	1	1
Logistics/transport businesses						
0-25	97	97	100	93	99	94
26-50	2	3	0	6	0	5
50+	1	1	0	1	1	1

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q9)

Table A1.2 UK-owned Businesses: Types of suppliers for different goods/services in the UK

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastructure
R&D/Design						
0-25	99	100	98	98	100	100
26-50	1	0	2	2	0	0
50+	0	0	0	0	0	0
Raw materials/components						
0-25	93	**92**	**95**	96	92	87
26-50	2	1	1	0	2	5
50+	5	6	**4**	4	7	9
ICT, computing, software						
0-25	97	100	96	95	98	91
26-50	1	0	4	0	2	0
50+	2	0	0	5	**0**	9
Capital goods/equipment						
0-25	99	98	100	100	100	91
26-50	1	2	0	0	0	9
50+	0	0	0	**0**	0	0
Logistics/transport businesses						
0-25	99	100	100	**100**	100	91
26-50	1	0	0	**0**	0	0
50+	0	0	0	0	0	0

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q9)

Table A1.3 FDIs reporting an impact on the innovation capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture Creative industries	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
The management of innovation						
Strong impact	4	3	3	8	4	5
Moderate impact	13	15	10	15	16	11
Any impact	17	18	13	23	20	16
Innovation absorptive capacity						
Strong impact	5	5	3	8	2	6
Moderate impact	12	13	15	13	10	9
Any impact	17	18	18	21	12	15
Cost/efficiency of innovation activities						
Strong impact	5	7	3	8	3	5
Moderate impact	11	13	10	12	10	8
Any impact	16	20	13	20	13	13
Innovation skills						
Strong impact	6	6	3	**11**	4	5
Moderate impact	13	13	11	14	16	11
Any impact	19	19	14	25	20	16
Ability to exchange knowledge/information						
Strong impact	5	7	3	8	3	5
Moderate impact	14	13	16	18	12	11
Any impact	19	20	19	26	15	16
Ability/willingness to collaborate with you						
Strong impact	6	7	3	**13**	3	5
Moderate impact	18	15	23	18	18	13
Any impact	24	22	26	31	21	18

Links/collaboration with other external organisations						
Strong impact	4	4	3	7	1	**10**
Moderate impact	13	13	14	16	12	12
Any impact	17	17	17	23	13	22

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.4 FDIs reporting an impact on the R&D capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D skills						
Strong impact	6	5	3	**13**	0	10
Moderate impact	12	10	10	10	20	13
Any impact	18	15	13	23	20	23
R&D practices						
Strong impact	4	2	3	**11**	1	5
Moderate impact	12	10	10	12	17	13
Any impact	16	12	13	23	18	18
Expenditure on R&D/innovation						
Strong impact	3	2	3	**8**	1	5
Moderate impact	9	7	9	9	10	7
Any impact	12	9	12	17	11	12

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.5 FDIs reporting an impact on the technological capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture Creative industries	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Technological competence/capability						
Strong impact	6	7	3	**13**	1	5
Moderate impact	14	14	14	12	16	9
Any impact	20	21	17	25	17	14
Ability to recognise technology principles and functions						
Strong impact	6	7	3	**12**	1	5
Moderate impact	11	8	9	11	**19**	7
Any impact	17	15	12	23	20	12
Ability to validate technology						
Strong impact	5	7	3	10	1	10
Moderate impact	11	7	9	13	17	10
Any impact	16	14	12	23	18	20
Ability to demonstrate feasibility of technology/find solutions						
Strong impact	6	9	3	10	4	5
Moderate impact	11	9	9	13	16	9
Any impact	17	18	12	23	20	14
Ability to operationalise technology						
Strong impact	5	9	3	10	1	5
Moderate impact	11	7	14	11	13	8
Any impact	16	16	17	21	14	13

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.6 FDIs reporting an impact on the intellectual property capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Ability to create intellectual property						
Strong impact	3	2	3	**9**	0	3
Moderate impact	8	6	3	10	11	11
Any impact	11	8	6	**19**	11	14
Product development						
Strong impact	5	6	3	**10**	3	4
Moderate impact	12	11	6	14	20	9
Any impact	17	17	9	24	23	13
Process development						
Strong impact	5	5	3	**10**	4	3
Moderate impact	12	9	11	12	16	11
Any impact	17	14	14	22	20	14

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.7 Impact of FDIs on the innovation capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
Ability/willingness to collaborate with you	16	31	47
Ability to exchange knowledge/information	14	28	42
Innovation skills	14	25	39
The management of innovation	14	21	34
Innovation absorptive capacity	14	21	35
Cost/efficiency of innovation activities	14	23	37
Links/collaboration with other external organisations	13	22	35

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.8 Impact of FDIs on the R&D capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
R&D skills	13	19	32
R&D practices	13	20	33
Expenditure on R&D/innovation	13	17	30

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.9 Impact of FDIs on the technology capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
Technological competence/capability	14	23	37
Ability to recognise and use technology	14	23	37
Ability to operationalise technology for products/services/processes	14	24	38

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.10 Impact of FDIs on the products, services and patents of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
Ability to create intellectual property	12	14	26
Product development	14	25	39
Process development	13	21	34

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.11 UK-owned businesses reporting an impact on the innovation capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture Creative industries	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
The management of innovation						
Strong impact	2	0	5	4	2	0
Moderate impact	6	5	4	8	6	13
Any impact	8	5	9	12	8	13
Innovation absorptive capacity						
Strong impact	1	0	4	0	0	0
Moderate impact	5	1	5	4	6	13
Any impact	6	1	9	4	6	13
Cost/efficiency of innovation activities						
Strong impact	1	0	4	0	0	0
Moderate impact	7	3	5	9	8	**18**
Any impact	8	3	9	9	8	18
Innovation skills						
Strong impact	3	0	**7**	6	0	0
Moderate impact	6	1	5	10	8	13
Any impact	9	1	12	16	8	13
Ability to exchange knowledge/information						
Strong impact	2	0	3	4	0	5
Moderate impact	7	5	7	12	6	13
Any impact	9	5	10	16	6	18
Ability/willingness to collaborate with you						
Strong impact	3	0	5	9	0	5
Moderate impact	7	3	9	6	8	13
Any impact	10	3	14	15	8	18

Links/collaboration with other external organisations						
Strong impact	2	0	4	0	0	5
Moderate impact	5	3	5	5	5	13
Any impact	7	3	9	5	5	**18**

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Table A1.12 UK-owned businesses reporting an impact on the R&D capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D skills						
Strong impact	1	0	2	2	2	0
Moderate impact	7	3	7	11	5	13
Any impact	8	3	9	13	7	13
R&D practices						
Strong impact	2	0	2	9	0	0
Moderate impact	7	3	8	7	7	13
Any impact	9	3	10	16	7	13
Expenditure on R&D/innovation						
Strong impact	1	0	2	2	0	0
Moderate impact	7	3	7	9	8	13
Any impact	8	3	9	11	8	13

Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Table A1.13 UK-owned businesses reporting an impact on the technological capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Technological competence/capability						
Strong impact	3	0	**7**	6	0	0
Moderate impact	8	7	8	8	7	18
Any impact	11	7	15	14	7	18
Ability to recognise technology principles and functions						
Strong impact	1	0	4	0	0	0
Moderate impact	9	7	9	15	6	15
Any impact	10	7	13	15	6	15
Ability to validate technology						
Strong impact	3	0	5	8	0	5
Moderate impact	8	6	7	7	9	13
Any impact	11	6	12	15	9	18
Ability to demonstrate feasibility of technology/find solutions						
Strong impact	2	0	**8**	0	0	0
Moderate impact	8	6	8	10	4	12
Any impact	10	6	16	10	4	12
Ability to operationalise technology						
Strong impact	1	0	**5**	0	0	0
Moderate impact	9	6	9	11	7	18
Any impact	10	6	14	11	7	18

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Table A1.14 UK-owned businesses reporting an impact on the intellectual property capabilities of their suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
Ability to create intellectual property						
Strong impact	2	0	5	0	2	0
Moderate impact	3	1	**6**	7	0	5
Any impact	5	1	**11**	7	2	5
Product development						
Strong impact	3	0	**7**	2	2	0
Moderate impact	6	5	6	8	4	13
Any impact	9	5	13	10	6	13
Process development						
Strong impact	2	0	**5**	2	0	0
Moderate impact	6	5	7	7	5	13
Any impact	8	5	12	9	5	13

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q10)

Table A1.15 Impact of UK-owned businesses on the innovation capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
The management of innovation	10	15	25
Innovation absorptive capacity	10	12	22
Cost/efficiency of innovation activities	10	14	24
Innovation skills	13	14	27
Ability to exchange knowledge/information	11	15	26
Ability/willingness to collaborate with you	11	18	29
Links/collaboration with other external organisations	9	13	22

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.16 Impact of UK-owned businesses on the R&D capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
R&D skills	8	11	19
R&D practices	8	11	19
Expenditure on R&D/innovation	8	10	18

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.17 Impact of UK-owned businesses on the technology capabilities of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
Technological competence/capability	10	15	25
Ability to recognise and use technology	9	14	23
Ability to operationalise technology for products/services/processes	9	14	23

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.18 Impact of UK-owned businesses on the products, services and patents of suppliers

	Percentages of all respondents		
	Strong impact	Moderate impact	Any impact
Ability to create intellectual property	9	9	18
Product development	11	15	26
Process development	9	13	22

Source: PACEC Survey of businesses, 2011 (Q8)

Table A1.19 FDIs reporting an impact on the innovation capabilities of their suppliers: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France[9]+ Benelux	Rest of Europe[10]	Rest of World
The management of innovation						
Strong impact	4	8	6	1	3	3
Moderate impact	13	20	7	6	20	**5**
Any impact	17	28	13	7	23	**8**
Innovation absorptive capacity						
Strong impact	4	8	5	1	3	3
Moderate impact	12	23	1	6	13	5
Any impact	16	31	6	7	16	8
Cost/efficiency of innovation activities						
Strong impact	5	8	8	1	5	3
Moderate impact	11	19	0	6	15	4
Any impact	16	27	8	7	20	7
Innovation skills						
Strong impact	5	8	10	1	5	3
Moderate impact	13	21	0	5	20	5
Any impact	18	29	10	6	25	8
Ability to exchange knowledge/information						
Strong impact	5	7	8	1	6	3
Moderate impact	14	26	3	6	16	8
Any impact	19	23	11	7	22	11
Ability/willingness to collaborate						
Strong impact	6	9	8	2	5	3
Moderate impact	18	30	9	5	22	9
Any impact	24	39	17	7	27	12

Links/collaboration with other external organisations						
Strong impact	4	5	8	1	5	3
Moderate impact	13	24	3	6	15	5
Any impact	17	29	11	7	20	8

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.20 FDIs reporting an impact on the innovation capabilities of their suppliers: by employment size

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
The management of innovation								
Strong impact	4	2	0	1	3	3	7	12
Moderate impact	13	7	4	12	12	13	18	17
Any impact	17	9	4	13	15	16	25	29
Innovation absorptive capacity								
Strong impact	4	2	0	1	3	3	7	8
Moderate impact	12	4	3	12	13	13	10	17
Any impact	16	6	3	13	16	16	17	25
Cost/efficiency of innovation activities								
Strong impact	5	0	5	1	3	3	7	12
Moderate impact	11	4	2	12	13	12	9	18
Any impact	16	4	7	13	16	15	16	30
Innovation skills								
Strong impact	6	2	4	1	4	3	8	13
Moderate impact	13	4	3	15	12	10	21	16
Any impact	19	6	7	16	16	13	29	29
Ability to exchange knowledge/information								
Strong impact	5	0	5	3	2	3	8	12
Moderate impact	14	9	2	15	16	17	13	18
Any impact	19	9	7	18	18	20	21	30

Ability/willingness to collaborate								
Strong impact	6	0	5	3	4	3	9	13
Moderate impact	18	9	5	16	18	15	20	26
Any impact	24	9	10	19	22	18	29	39
Links/collaboration with other external organisations								
Strong impact	4	0	4	1	1	10	7	5
Moderate impact	13	7	3	13	16	12	12	26
Any impact	17	7	7	14	17	22	19	31

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.21 FDIs reporting an impact on the R&D capabilities of their suppliers: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France + Benelux	Rest of Europe	Rest of World
R&D skills						
Strong impact	5	6	8	2	5	3
Moderate impact	13	15	7	5	**21**	8
Any impact	18	21	15	7	26	11
R&D practices						
Strong impact	4	5	3	2	3	3
Moderate impact	12	16	5	5	**22**	6
Any impact	16	21	8	7	25	9
Expenditure on R&D/innovation						
Strong impact	3	6	3	1	3	3
Moderate impact	9	**15**	**0**	6	12	2
Any impact	12	21	3	7	15	5

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.22 FDIs reporting an impact on the R&D capabilities of their suppliers: by employment size

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
R&D skills								
Strong impact	6	0	5	1	5	10	9	6
Moderate impact	12	5	6	16	13	15	16	14
Any impact	18	5	11	17	18	25	25	20
R&D practices								
Strong impact	4	0	0	1	3	3	9	6
Moderate impact	12	5	14	16	13	10	16	10
Any impact	16	5	14	17	16	13	15	16
Expenditure on R&D/Innovation								
Strong impact	3	0	0	1	3	3	7	5
Moderate impact	9	3	7	16	12	12	2	11
Any impact	12	3	7	17	15	15	9	16

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.23 FDIs reporting an impact on the technological capabilities of their suppliers: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France + Benelux	Rest of Europe	Rest of World
Technological competence/ capability						
Strong impact	5	8	3	1	6	5
Moderate impact	13	19	7	**4**	**22**	5
Any impact	18	27	10	5	28	10
Ability to recognise technology principles and functions						
Strong impact	5	8	3	0	6	5
Moderate impact	11	15	7	5	17	6
Any impact	16	23	10	5	23	11

Ability to validate technology						
Strong impact	5	8	11	0	5	3
Moderate impact	11	14	3	4	**19**	5
Any impact	16	22	14	4	24	8
Ability to demonstrate feasibility of technology/find solutions						
Strong impact	6	10	7	1	6	3
Moderate impact	11	14	7	4	**19**	4
Any impact	17	24	14	5	25	7
Ability to operationalise technology						
Strong impact	5	8	6	1	7	3
Moderate impact	11	**18**	4	4	13	6
Any impact	16	26	10	5	20	9

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.24: FDIs reporting an impact on the technological capabilities of their suppliers: by employment size

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
Technological competence/ability								
Strong impact	6	3	5	1	7	3	9	10
Moderate impact	14	**0**	9	13	13	12	16	22
Any impact	20	3	14	14	20	15	25	32
Ability to recognise technology principles and functions								
Strong impact	6	3	5	0	6	3	9	10
Moderate impact	11	**0**	7	14	11	10	13	15
Any impact	17	3	12	14	17	13	22	25
Ability to validate technology								
Strong impact	5	3	4	0	3	10	8	9
Moderate impact	11	**0**	10	12	12	10	14	14
Any impact	16	3	14	12	15	20	22	23

Ability to demonstrate feasibility of technology/find solutions								
Strong impact	6	3	5	1	4	3	8	**16**
Moderate impact	11	2	7	13	11	12	13	14
Any impact	17	5	12	14	15	15	21	30
Ability to operationalise technology								
Strong impact	5	5	5	1	4	3	7	9
Moderate impact	11	0	7	15	12	10	6	14
Any impact	16	5	12	16	16	13	13	23

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.25 FDIs reporting an impact on the intellectual property, products and processes of suppliers: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France + Benelux	Rest of Europe	Rest of World
Ability to create intellectual property						
Strong impact	3	6	0	1	4	3
Moderate impact	8	12	5	5	9	3
Any impact	11	18	5	6	13	6
Product development						
Strong impact	5	8	6	1	5	3
Moderate impact	12	18	5	6	19	5
Any impact	17	26	11	7	24	8
Process development						
Strong impact	5	8	6	2	4	3
Moderate impact	12	**20**	5	4	17	5
Any impact	17	28	11	6	21	8

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.26: FDIs reporting an impact on the intellectual property, products and processes of suppliers: by size of employment

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
Ability to create intellectual property								
Strong impact	3	0	4	1	2	3	7	6
Moderate impact	8	2	7	14	13	5	7	3
Any impact	11	2	11	15	15	8	14	9
Product development								
Strong impact	5	2	5	0	2	3	8	**14**
Moderate impact	12	2	5	20	17	12	19	6
Any impact	17	4	10	20	19	15	27	20
Process development								
Strong impact	5	2	4	1	2	3	7	**14**
Moderate impact	12	2	7	20	13	6	16	12
Any impact	17	4	11	21	15	9	23	16

Source: PACEC Survey of Inward Investors, 2012 (Q13)

Table A1.27 FDI Impacts on different types of suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D/Design						
Strong impact	3	3	1	**9**	1	6
Moderate impact	10	14	5	12	8	11
Any impact	13	17	6	**21**	9	17
Raw materials/components						
Strong impact	7	9	2	10	5	11
Moderate impact	13	18	9	16	13	4
Any impact	20	27	11	26	18	15

Business services						
Strong impact	4	2	3	7	4	7
Moderate impact	11	13	12	13	9	7
Any impact	15	15	15	20	13	14
Capital goods/equipment						
Strong impact	3	3	3	4	3	3
Moderate impact	9	14	3	**16**	5	6
Any impact	12	17	6	**20**	8	9
Logistics/Transport						
Strong impact	3	4	1	4	3	7
Moderate impact	14	22	16	15	7	9
Any impact	17	26	17	19	10	16

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of Inward Investors, 2012 (Q15)

Table A1.28 UK-owned Businesses: Impacts on different types of suppliers

	Percentages of all respondents					
	Total	Conventional manufacture	Finance and business services	Hi-tech	Retail, wholesale, leisure	Misc infrastruc-ture
R&D/Design						
Strong impact	2	0	4	6	0	0
Moderate impact	7	4	4	22	7	5
Any impact	9	4	8	**28**	7	5
Raw materials/components						
Strong impact	1	0	0	7	0	0
Moderate impact	9	5	8	6	11	**23**
Any impact	10	5	8	13	11	23
Business services						
Strong impact	4	0	6	15	0	0
Moderate impact	8	4	11	11	7	10
Any impact	12	4	17	**26**	7	10

Capital goods/equipment						
Strong impact	1	0	3	0	0	5
Moderate impact	4	2	3	4	4	10
Any impact	5	2	6	**4**	4	15
Logistics/Transport						
Strong impact	3	4	1	2	0	10
Moderate impact	4	2	6	0	6	0
Any impact	7	6	7	2	6	10

Note: Results are highlighted in bold where the result is significantly different from the corresponding statistics in the total column (at the 95 per cent level, using a chi-squared test)
Source: PACEC Survey of UK-owned Businesses, 2012 (Q12)

A2 The mechanisms use to influence suppliers

Table A2.1 Type of direct assistance provided by FDIs to suppliers to increase their innovation capability/capacity: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France + Benelux	Rest of Europe	Rest of World
Joint ventures	4	6	0	2	7	3
Information on markets	7	13	1	1	6	7
Technical assistance	13	22	10	2	14	5
Financial assistance	5	10	6	0	1	3
Procurement assistance	4	2	4	1	8	3
Training/staff development	6	10	11	1	6	1
Managerial/ organisational assistance	6	8	8	3	5	6
Advice on intellectual property	3	3	9	0	3	0
Other	8	6	3	12	15	1
None	75	66	81	81	68	90
Number of respondents (rate=%)	*496*	*151*	*61*	*72*	*112*	*100*

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q19)

Table A2.2 Type of direct assistance provided by FDIs to suppliers to increase their innovation capability/capacity: by size of employment

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
Joint ventures	4	0	7	4	3	4	3	12
Information on markets	7	0	6	2	1	7	8	12
Technical assistance	13	0	9	12	13	10	18	21
Financial assistance	5	0	2	0	3	3	3	19
Procurement assistance	4	0	4	1	1	10	3	9
Training/staff development	6	0	8	8	6	0	4	16
Managerial/ organisational assistance	6	5	6	7	3	7	8	5
Advice on intellectual property	3	0	4	7	1	3	1	5
Other	8	1	3	1	6	10	7	6
None	75	94	88	86	78	68	72	72
Number of respondents (rate=%)	*496*	*45*	*43*	*35*	*84*	*43*	*89*	*76*

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (Q19)

Table A2.3 Mechanisms for transmitting impacts to suppliers - very important/important: by country of origin

	Percentages of all respondents					
	Total	USA	Germany	France + Benelux	Rest of Europe	Rest of World
Through the scale of purchases	27	39	32	14	29	16
Contractual arrangements for performance/quality	29	30	26	19	33	19
Supplier reviews	25	34	32	13	27	12
Staff development /training	20	30	14	17	26	7
Joint working on design/quality	25	33	26	17	29	17
Other mechanism	6	8	17	4	9	0

Source: PACEC Survey of Inward Investors, 2012 (Q20)

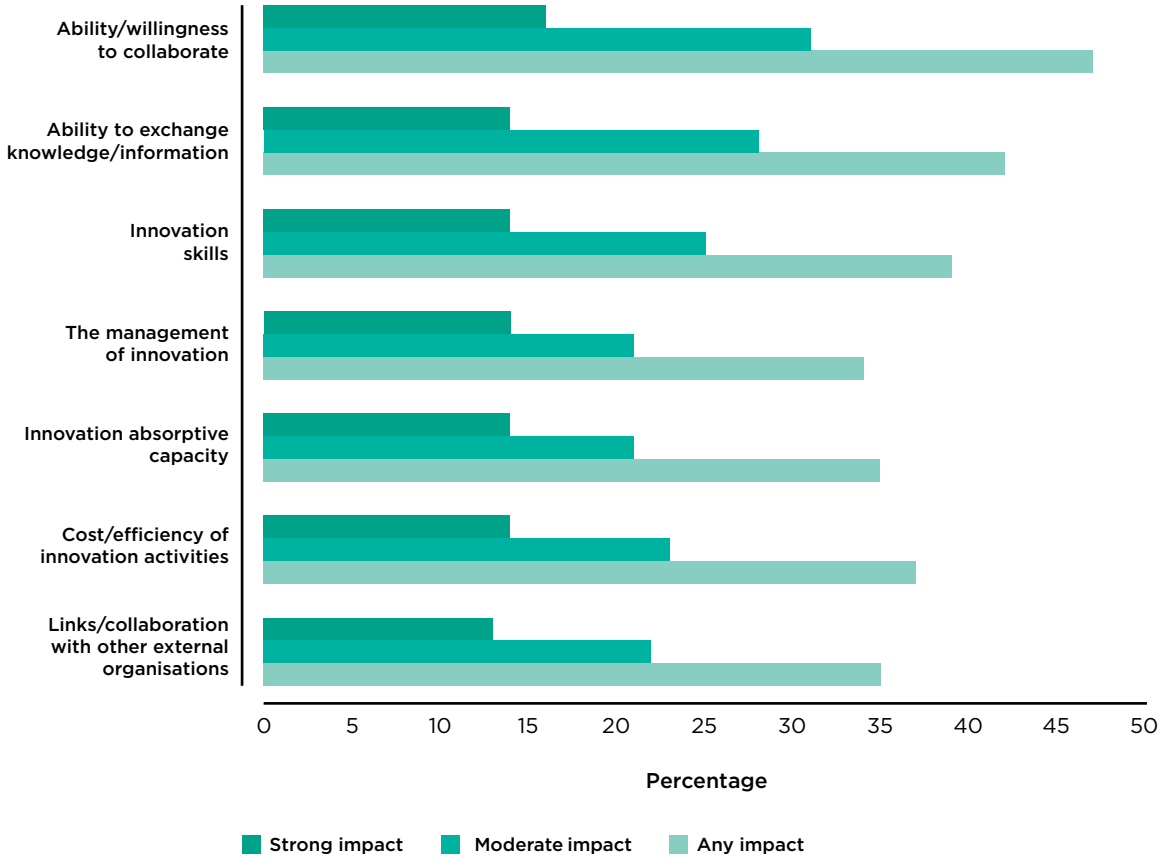
Table A2.4 Mechanisms for transmitting impacts to suppliers - very important/important: by size of employment

	Percentages of all respondents							
	Total	0-5	6-10	11-19	20-49	50-99	100-250	250+
Through the scale of purchases	27	10	20	34	22	30	25	47
Contractual arrangements for performance/quality	29	12	20	19	25	32	33	46
Supplier reviews	24	7	19	19	23	21	27	45
Staff development /training	20	10	16	14	18	10	23	39
Joint working on design/quality	26	15	21	23	23	23	35	28
Other mechanism	6	0	5	0	8	0	3	16

Respondents could select more than one option; so percentages in any column may sum to more than 100
Source: PACEC Survey of Inward Investors, 2012 (q20)

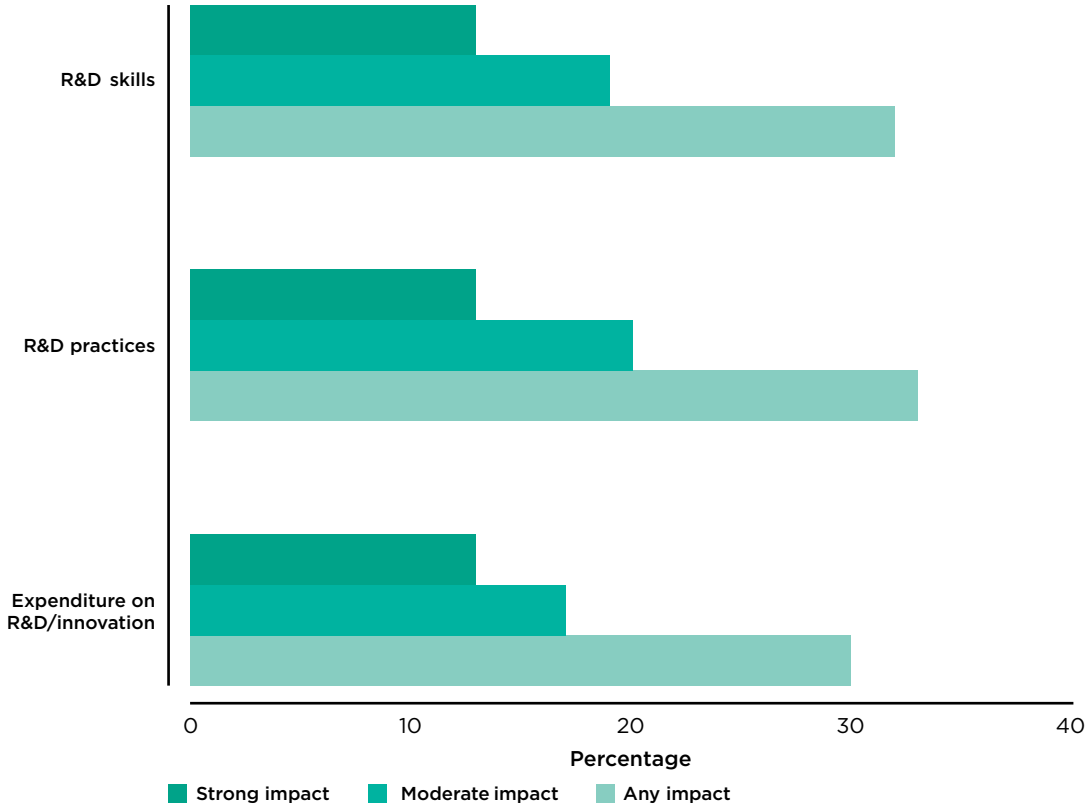
APPENDIX B FIGURES AND CHARTS

Figure B1.1 FDIs reporting an impact on the innovation capabilities of their suppliers



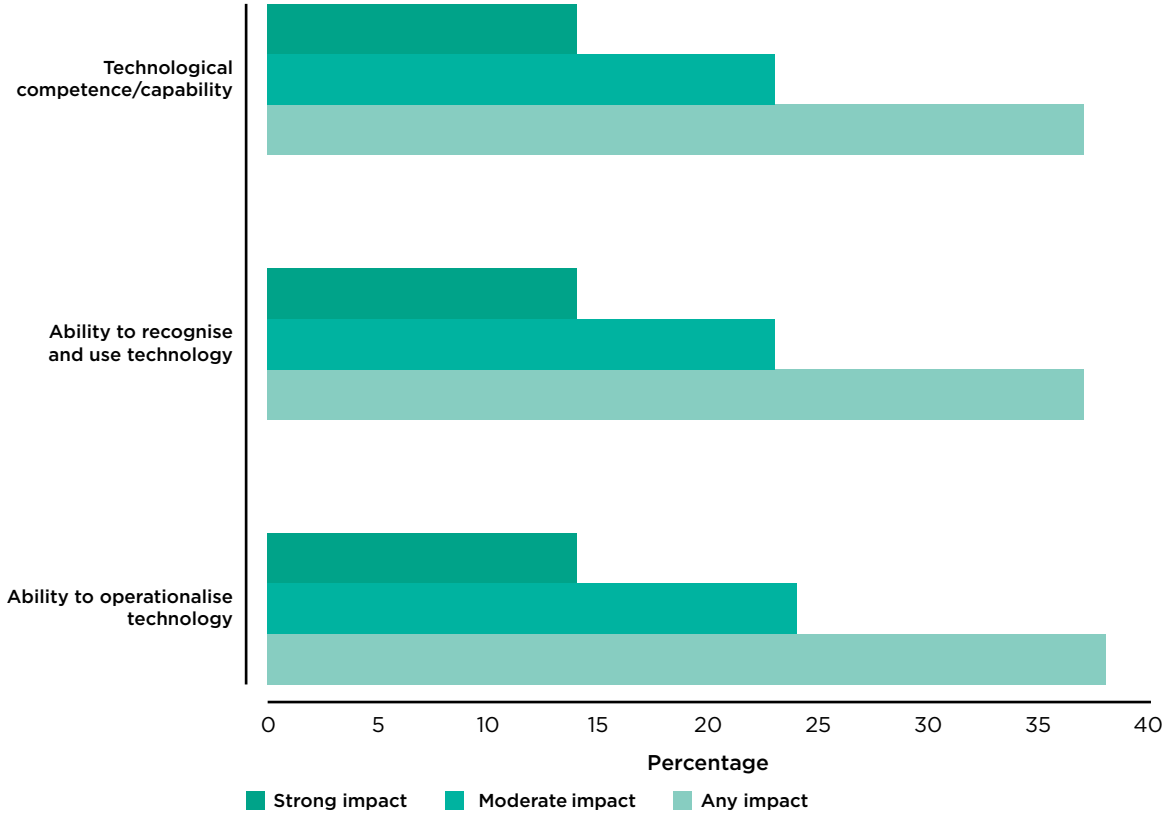
Source: PACEC Survey of Inward Investors, 2012

Figure B1.2 FDIs reporting an impact on the R&D capabilities of their suppliers



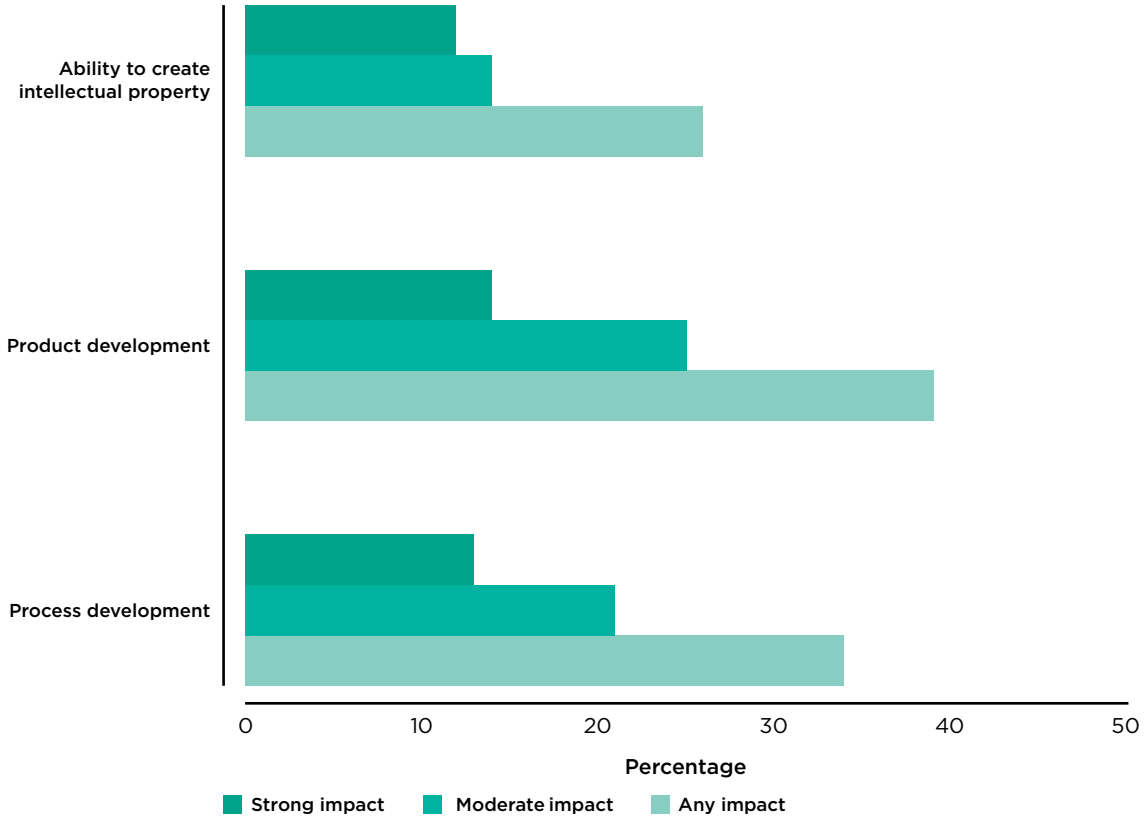
Source: PACEC Survey of Inward Investors, 2012

Figure B1.3 FDIs reporting an impact on the technological capabilities of their suppliers



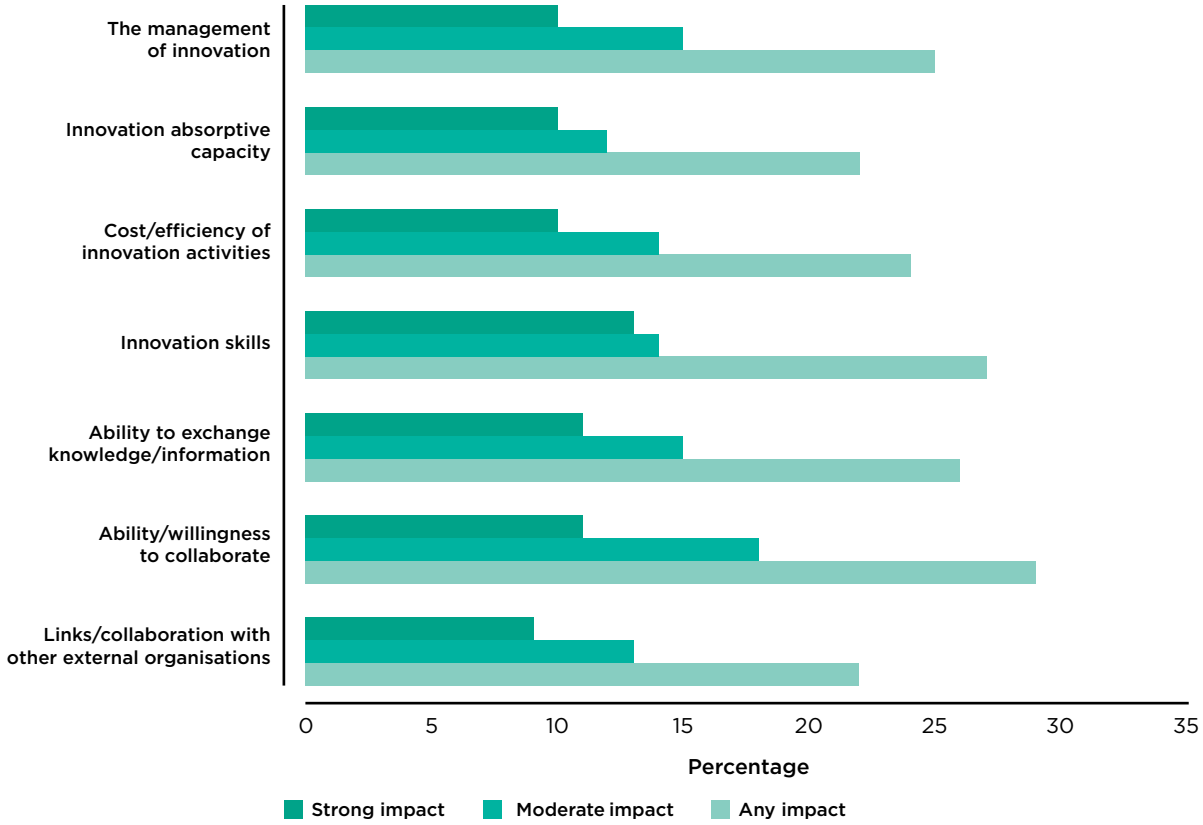
Source: PACEC Survey of Inward Investors, 2012

Figure B1.4 FDIs reporting an impact on the intellectual property capabilities of their suppliers



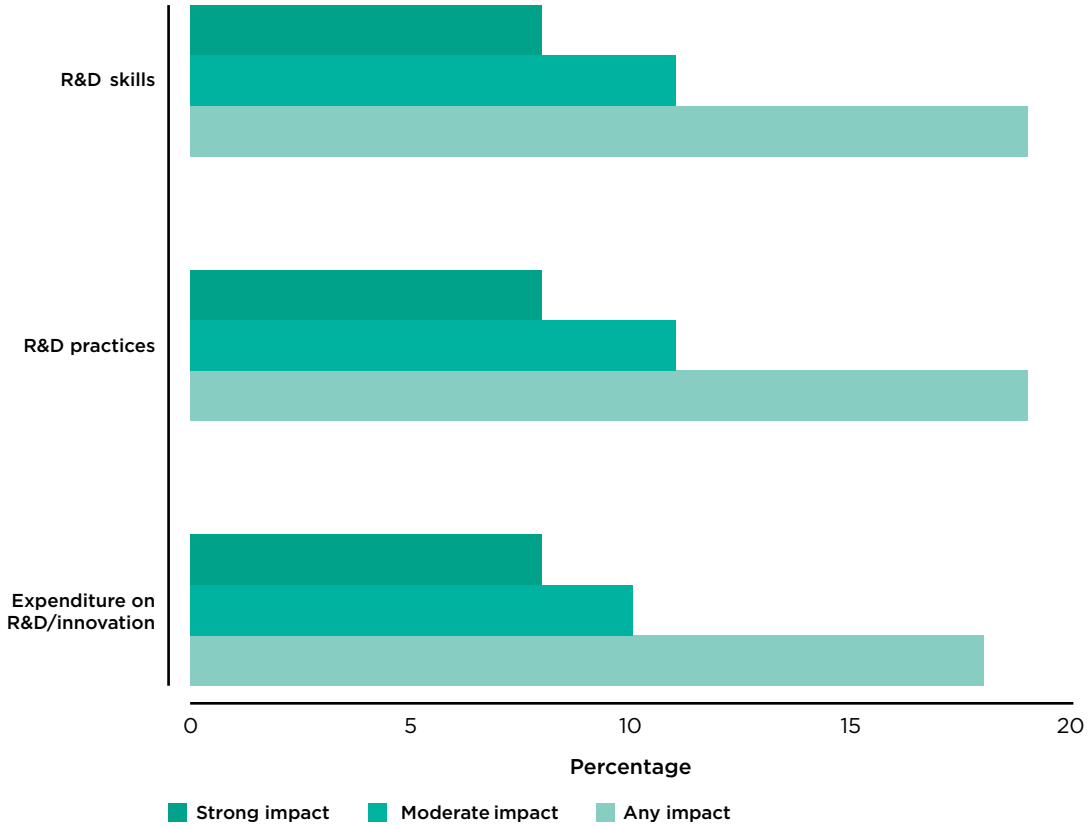
Source: PACEC Survey of Inward Investors, 2012

Figure B1.5 UK-owned businesses reporting an impact on the innovation capabilities of their suppliers



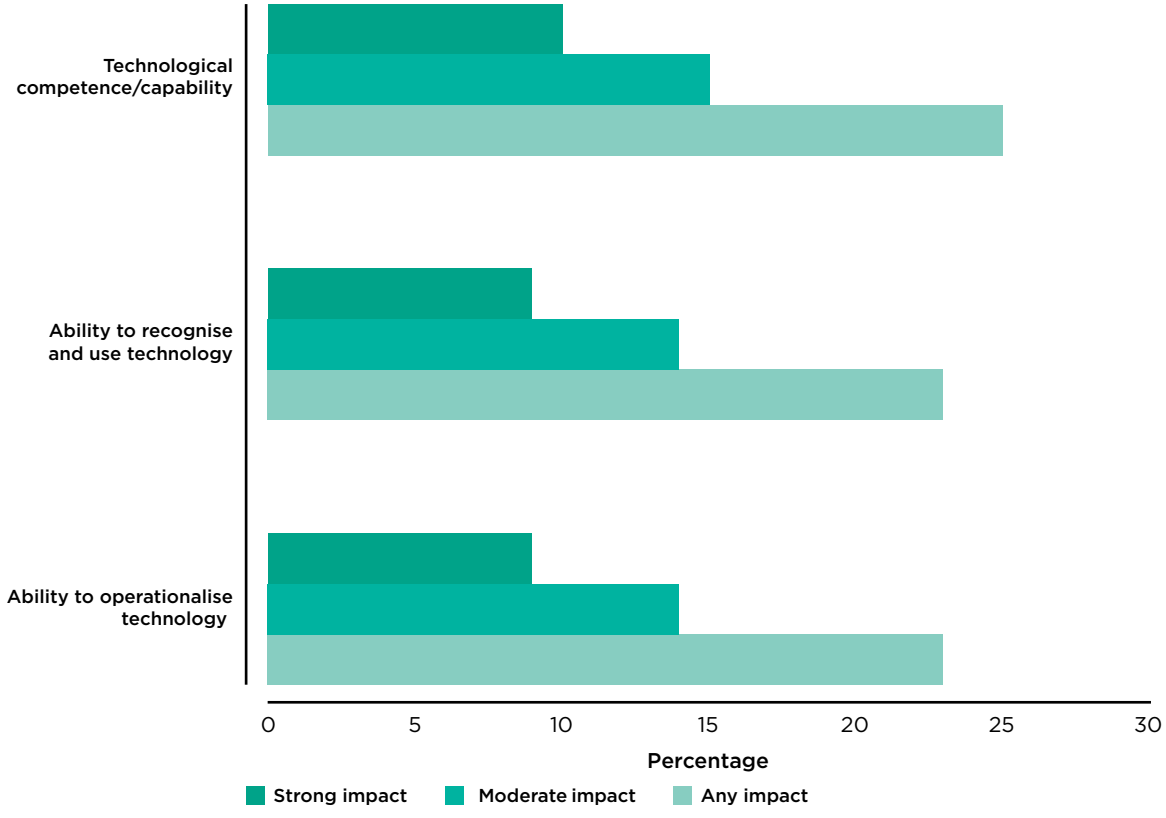
Source: PACEC Survey of UK-owned Businesses, 2012

Figure B1.6 UK-owned businesses reporting an impact on the R&D capabilities of their suppliers



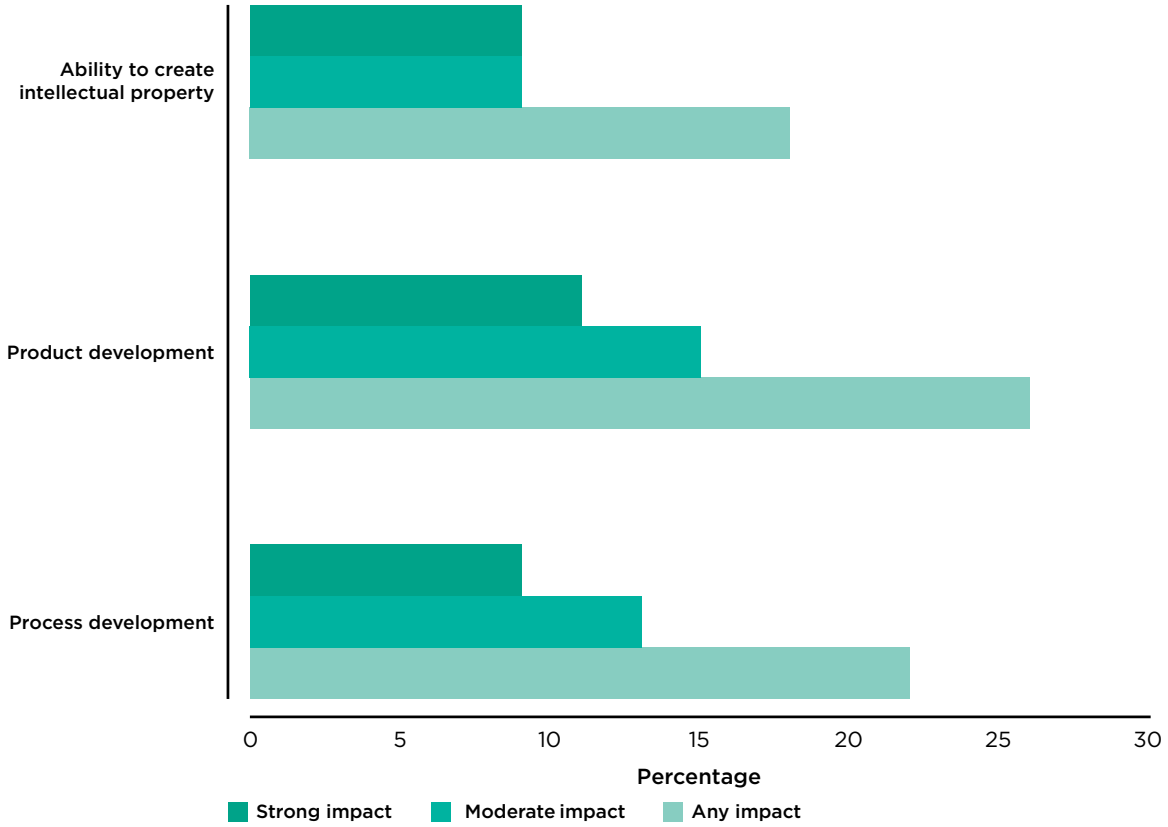
Source: PACEC Survey of UK-owned businesses, 2012

Figure B1.7 UK-owned businesses reporting an impact on the technological capabilities of their suppliers



Source: PACEC Survey of UK-owned businesses, 2012

Figure B1.8 UK-owned businesses reporting an impact on the intellectual property capabilities of their suppliers



Source: PACEC Survey of UK-owned businesses, 2012

APPENDIX C DETAILED REGRESSION RESULTS

C1.1
In addition to the models presented in the main report, two groups of statistical models have been built which test for individual types of impact (e.g. impact upon R&D skills, impact upon R&D practices etc.). One group of models predicts the probability of strong impacts upon suppliers, and the other predicts the probability of any impact (strong or moderate).

C2 Results

C2.1
The key drivers of innovation impacts upon suppliers were as follows:

- Conducting R&D in the UK.
- Developing new processes (all impacts) or products/services (particularly for strong impacts) in the last three years.
- Supplier selection criteria: general business practices (for all impacts) and R&D criteria (particularly for strong impacts).
- Collaboration with other organisations on innovation and technological issues.
- Provision of direct assistance to suppliers (various forms).

C2.2
Independently of the above, the impacts of FDI upon companies with at least 90 per cent significance were as follows:

- 1.9x higher odds of impact upon ability to collaborate with the company (95 per cent significance).
- 3.3x higher odds of strong impact upon R&D skills (90 per cent significance).

C2.3
The full set of impact models, the odds ratios of the independent variables, and their significance, is set out in Table C2.5 (all impacts) and Table C2.6 (strong impacts) below.

Table C2.5 FDIs and UK-owned businesses: Impacts on the innovation capabilities of suppliers

	Odds ratios and significance of independent variables																		
	Sector					Last 3 years		Criteria for supplier selection				Policies		Direct assistance					
	FDI	Conventional manufacture	Misc. infrastructure	UK R&D	Recent	New processes	New products/services	General business practices	R&D	Innovation	Technical	Strategy/policy	Collaboration	Joint ventures	Technical	Financial	Procurement	Training/staff	Managerial	IP advice
R&D																				
R&D skills				3.4***		3.5***		5.5***	3.0***	1.9*		2.4**	1.7*	3.2**	4.5***					
R&D practices		0.4**		3.9***	0.5**	3.1***		4.7***	5.2***					6.0***	8.5***					
Expenditure on R&D/innovation				5.2***		2.8***		11.3***						6.7***	7.1***				0.2***	
Innovation																				
The management of innovation							2.4***	3.4***	2.6***		2.2**		2.9***	2.6*	4.7***	4.0**				
Innovation absorptive capacity				1.9**		2.3***		6.0***	2.8***		2.0**		2.0**	2.9**	4.8***					0.3*
Cost/efficiency of innovation activities			2.2*	2.1**		2.0**		3.2***	2.8***				2.8***	5.2***	5.8***					
Innovation skills				2.9***		3.4***		3.2**	3.6***	2.0*		3.4***	2.8***		3.5***		3.9**			
Ability to exchange knowledge/ information				2.3***	0.6*		2.6***	3.9***	2.2*	4.6***			1.9**	2.7*	7.2***		3.4*			0.3*
Ability/willingness to collaborate with you	1.9**			2.5***			1.8**	4.6***		4.2***	1.9*		2.1***		6.7***	3.7	3.3*			
Links/collaboration with other external organisations			2.7**	2.4***		1.7*		6.2***	2.7***				3.5***	3.3**	10.0***					0.2**
Technology																				
Technological competence/ capability				2.7***	0.6			2.5**	2.6**	2.1*	2.5**		1.9**	5.6***	10.9***			2.9*	0.3**	
Ability to recognise technology principles and functions				2.3***		2.1***		4.0***	4.1***			2.3**	2.2***		6.1***		2.9*			
Ability to validate technology			2.0*	1.8*		2.3***		2.9***	3.1***		2.2**		2.3***	2.8**	6.5***					
Ability to demonstrate				1.8*		2.3***		3.1***	2.8***	2.5***			2.6***		7.5***		2.8*			
IP/Products																				
Ability to operationalise technology				1.9**		1.8**		3.2***	2.0*	2.6***			1.8*	3.9***	8.0***					0.3*
Ability to create intellectual property				2.2**		2.7***		5.3***	3.6***					4.0***	5.4***					0.3*
Product development				2.0**		2.7***		5.5***			2.5***			6.5***	9.5***					
Process development				1.9**		3.0***		5.0***	2.9***					11.9***	7.1***				0.3**	
Other impacts				3.3***	0.5*	2.8***		5.3***						4.3***	6.0***					0.3*

Note: *: 90% significance, **: 95% significance, ***: 99% significance; all others 80% significance where shown. Source: PACEC

Table C2.6 FDIs and UK-owned businesses: Strong impacts on the innovation capabilities of suppliers

	Odds ratios and significance of independent variables																								
	Sector					UK activities				New in last 3 years			Supplier selection criteria						Direct assistance						
	FDI	Conventional manufacture	Hi-tech	Finance and business	Misc. infrastructure	Manufacture	R&D	Over 50 employees	Since 2000	Processes	Products/services	IP	General	R&D	Innovation	Technical	Strategy/policy	Collaboration	Joint ventures	Market information	Technical	Financial	Procurement	Training/staff	Managerial
R&D skills	3.3*		2.4*				2.7*			4.3***				2.9*	4.7***					6.5***			8.2***	5.6***	
R&D practices			4.5***			0.3*	2.6	3.3**		5.7***		4.8***		5.3***						6.0***	2.8*		10.9***	2.8*	
Expenditure on R&D /innovation			5.1**	5.8**	7.3*					6.5**				6.1***			3.3*			5.4**	4.5**			4.1**	
Innovation																									
The management of innovation											10.9**			4.9***			4.9***					13.3***	14.8***		
Innovation absorptive capacity											10.6**			3.7**				4.3**			3.8**		4.3**		
Cost/efficiency of innovation activities				2.6*						3.8**				3.7**			3.2**	3.3**				4.0**	6.4***	4.1**	
Innovation skills											4.1**		0.3	6.2***		3.4**	2.6*	3.1**				3.6*	12.1***	5.3***	
Ability to exchange knowledge/information											5.6**			3.6**			4.6***	3.0**					13.7***	5.1***	
Ability/willingness to collaborate with you		6.5**	8.4***	7.8**	8.0*						3.6**			4.1***		3.1**	2.4*	3.4**				3.2*	7.6***	6.6***	
Links/collaboration with other external organisations				4.7**	9.8***									5.0***				5.1**	6.2***		5.9***				4.1**
Technology																									
Technological competence /capability			3.6**	2.5						2.5**				6.9***			3.0**			4.2**	2.8**			7.4***	
Ability to recognise technology principles and functions		13.0**	24.0***	14.5**	19.4**									4.7***						4.0**	6.2***			5.5***	
Ability to validate technology		13.9**	16.6**	19.1**	32.5***									6.3***				3.9**			5.5***		3.1*	4.3***	
Ability to demonstrate				2.4*						2.4*				3.3**			3.5***	3.2**				5.1**	6.4***	3.9**	
IP/Products																									
Ability to operationalise technology		6.7**		9.0**	8.4**									4.2***				3.3**			7.9***			4.8***	
Ability to create intellectual property				3.0*						3.9**		4.3**								7.9***	6.4**	5.9**	6.1**		
Product development											4.6**			2.5*			2.7**	2.4*			4.1***	5.6***	4.3**		
Process development											6.1**			2.8**						5.3***	4.6***			3.3**	
Other impacts		11.9**		52.2***	23.7**			3.2	0.2*	12.1**		4.7*								5.3*	8.8**	9.7***	5.0*		

Note: *: 90% significance, **: 95% significance, ***: 99% significance; all others 80% significance where shown Source: PACEC

ENDNOTES

1. DTI. PACEC re Wider Effects of Inward Investment.
2. See the Introduction to the report for the response rates.
3. See Chapter 7 for a full explanation of 'odds ratios' and the regression analysis.
4. See Table 2.1, Analysis of UKTI trends.
5. DTI. PACEC.
6. This is generally defined as the ability to recognise the principles of technology, examine the feasibility issues and find solutions, and operationalise technology for use in products, services and processes.
7. The survey excluded utilities, general office supplies, maintenance, cleaning, and security.
8. Note that the odds increase if an impact is more likely. This is the opposite of bookmakers' odds, which are the odds against something occurring.
9. 'Benelux' is an abbreviation for Belgium, the Netherlands, and Luxembourg.
10. The most significant of these countries in terms of the numbers of investments are Sweden, Ireland, Switzerland, and Denmark. The other FDI countries include Austria, Finland, Gibraltar, Iceland, Italy, Liechtenstein, Malta, and Norway.

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