



European Commission

Monitoring industrial
research:

**The 2005 EU SURVEY
on R&D Investment
Business Trends in
10 Sectors**

**Directorate General
Joint Research Centre**

**Directorate General
Research**

Acknowledgements

This *2005 EU Survey on R&D Investment Business Trends in 10 Sectors* is part of the Industrial Research Investment Monitoring activity carried out jointly by the Joint Research Centre (DG JRC) and Research (DG RTD) Directorates-General of the European Commission. The work has been conducted by the JRC's Institute for Prospective Technological Studies (DG JRC-IPTS), with overall monitoring and guidance provided by Directorate M (Investment in research and links with other policies) of DG RTD.

Within DG JRC-IPTS the project was coordinated and carried out by the Support to the European Research Area Unit (SERA - Head of Unit: Patrice Laget) under the leadership of Pietro Moncada-Paternò-Castello, who also contributed to the analysis. Alexander Tübke from DG JRC-IPTS was the main author of this report. Lesley Potters and René van Bavel from the SERA Unit and James Gavigan, Antonio Puente Rodero and Patrick Mc Cutcheon from DG RTD-M also contributed to it.

The project benefited from contributions from external experts, namely Andrew Dearing (European Industrial Research Management Association), Ben Dankbaar (Radboud University Nijmegen), Parimal Patel (University of Sussex, SPRU), Carlos Montalvo (TNO) and Han Roseboom (TNO), who were co-ordinated by Jos Leijten (TNO) through the European Techno-Economic Policy Support network (ETEPS).

DG JRC-IPTS and DG RTD-M thank all those who have contributed to this project, especially John van den Elst (Philips Electronics), Keith Smith (Australian Innovation Research Centre) as well as the colleagues from the SERA Unit.

Comments and inputs can be sent by email to: JRC-IPTS-IRI@cec.eu.int

More information on Industrial Research and Innovation is available at: <http://iri.jrc.es/>

Legal notice

The orientation and content of this report cannot be taken as indicating the position of the European Commission or its services. The European Commission retains the copyright to this publication. Reproduction is authorised, except for commercial purposes, provided the source is acknowledged. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of the information in this report.

Technical Report EUR 22303 EN

© European Communities, 2006

Printed in Spain

TABLE OF CONTENTS

KEY FINDINGS.....	I
1 INTRODUCTION	1
2 EXPECTATIONS FOR R&D INVESTMENT.....	3
3 REASONS FOR INVESTING IN R&D	5
4 SOURCES OF R&D INVESTMENT	8
5 IN-HOUSE R&D AND OUTSOURCING.....	9
6 CHOICE OF R&D INVESTMENT LOCATION	10
7 OUTCOMES FROM R&D INVESTMENT	15
8 REASONS FOR NOT INVESTING IN R&D.....	17
9 FREQUENTLY CITED SUGGESTIONS.....	18
10 ANNEX A: THE METHODOLOGY OF THE PILOT SURVEY	19
11 ANNEX B: FIGURES BY SECTOR.....	26
12 ANNEX C: THE QUESTIONNAIRE.....	30

KEY FINDINGS

This **pilot survey** on R&D investment business trends provides new insights into company expectations about future R&D investments and their motivations to invest in research. The main results are as follows:

- Companies expect their global investments in R&D **to grow** by around 5% p.a. for the next three years. These expectations reflect the dominance in the sample of the companies in pharmaceuticals & biotechnology and chemicals, which together account for almost 60% of the total R&D investment of all companies in the sample.
- The **incentives to increase R&D investment** most often cited in the responses are: changes in market demand for new products and services, changes in technological opportunities, and changes in company turnover or profit. Changes in the availability and labour costs of researchers are the least often cited incentives for increasing R&D investment.
- Own funds are by far the principal **source for financing** the company's R&D, followed by tax incentives and public grants.
- Companies **outsource** an average of 18% of their R&D investment. Around two thirds of this amount goes to other companies and one third to public research organisations. The sector which outsources most of its R&D is pharmaceuticals and biotechnology (25%), and the least is IT hardware (5%).
- The most important factors when deciding where to **locate R&D** are: market access, high availability of researchers, access to specialised R&D knowledge and results, macroeconomic and political stability, and R&D cooperation opportunities. The often mentioned labour costs of researchers seem to be less significant.
- The survey confirms the view that companies continue to prefer to locate R&D in their home country. Therefore, the **top locations for R&D activity** in Europe continue to be Germany, the United Kingdom and France. Outside the EU, the US remained by far the most attractive place for locating R&D activity, followed by China and India.
- New products resulting from R&D are mainly **exploited** by the company itself.

The results are drawn from the responses received from 449 companies covering ten sectors: automobiles & parts, chemicals, electronic & electrical equipment, engineering & machinery, food producers & processors, health, IT hardware, pharmaceuticals & biotechnology, steel & other metals and support services. Taken together, the 449 responding companies are responsible for a total global R&D investment of almost €30 billion, which is a significant share of European business investment in R&D.

1 INTRODUCTION

Increasing and improving Research and Development (R&D) investment in Europe is at the heart of the EU's Lisbon Strategy¹. However, information permitting consistent comparisons, across the EU and across different sectors, of current and prospective trends in R&D investment practices of firms is presently not available. In order to support policymakers in this field and monitor progress towards the Lisbon targets, the present survey gathers information, at a European level, on factors and issues which surround and influence R&D investment in companies. The survey is also a valuable source of information for companies and analysts in order to assess trends at corporate level. It is part of a wider range of activities within the Industrial Research Investment Monitoring (IRIM) initiative² undertaken jointly by the Directorate General Research (DG RTD M)³ and Joint Research Centre, Institute of Prospective Technological Studies (DG JRC-IPTS)⁴. The survey is closely related to the *EU Industrial R&D Investment Scoreboard*⁵. This document describes the results of the **pilot phase** of the IRIM survey. The pilot questionnaire addressed R&D investment levels and trends, R&D location strategy and management and outcomes of R&D strategy. The survey provides new insights into company expectations about future R&D investments and their motivations to invest in research. Some other results largely confirm many observations found in the literature. The pilot survey tested different ways of approaching target samples. A total of 583 responses from 29 sectors were received. In addition, a high concentration of responses by sector was observed. In order to have a sectoral analysis, the results presented here are drawn from 449 responses in the following ten sectors (number of responses in brackets):

- Automobiles & parts (21 responses)
- Chemicals (143)
- Electronic & electrical equipment (19)
- Engineering & machinery (93)
- Food producers & processors (18)
- Health, mainly medical equipment companies (22)
- IT hardware (11)
- Pharmaceuticals & biotechnology (81)
- Steel & other metals (21)
- Support services, mainly companies providing contract research and R&D related services related to the pharmaceuticals & biotechnology sector (20)

Taken together, the 449 responding companies are responsible for a total global R&D investment of almost €30 billion, which is a significant share of European business investment in R&D.

¹ See the joint EU research and innovation Action Plan <http://europa.eu.int/invest-in-research>.

² See <http://iri.jrc.es>

³ See http://ec.europa.eu/research/index_en.cfm

⁴ See http://www.jrc.es/home/pages/action_4132.htm

⁵ The Scoreboard provides economic and financial data and analysis of companies from the EU and abroad investing the most in R&D. It is published annually in order to provide an up-dated tool for comparisons between companies, sectors, and geographical areas, and to offer a full picture of the competitive situation of EU firms in the global R&D environment (see <http://iri.jrc.es/do/home/portal/seccionview?IDIDIOMA=1&IDSECCION=5>).

As there is also a high concentration of R&D investment by company type, the analysis is mainly based on the 293 responses from “independent EU companies”⁶. Additional results from the responses of 120 “EU subsidiary companies”⁷ and 36 “non-EU subsidiary companies”⁸ are only presented where there are considerable differences to the results of the independent EU companies. More information about the methodology and concentration of R&D investment amounts can be found in the Annex.

⁶ “Independent EU companies” refers to companies identified as not being controlled by another one at the time of the survey. These companies are all located in the EU. The independent EU companies constitute more than 90 % of the R&D investment of all companies in the sample.

⁷ “EU subsidiaries” refers to companies identified as subsidiaries of another EU company at the time of the survey. These companies are all located in the EU and their parents are companies located in the EU. They constitute about 5 % of the R&D investment in the sample.

⁸ “Non EU subsidiary” refers to companies identified as subsidiaries of a non EU company at the time of the survey. These companies are all located in the EU and their parents are companies located outside the EU. They constitute less than 5 % of the R&D investment in the sample.

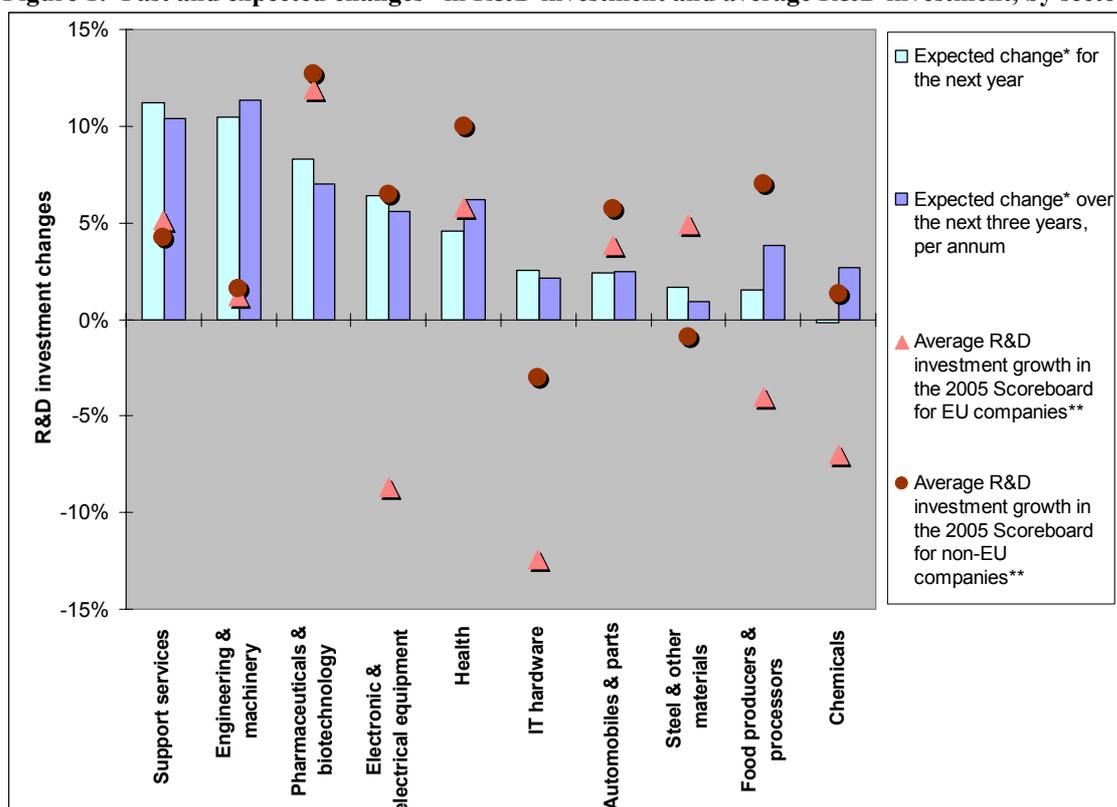
2 EXPECTATIONS FOR R&D INVESTMENT

In terms of weighted average, respondents expect their global R&D investments to grow by about the same rates for the next year and the next three years (around 5% p.a.). These expectations are determined by the sectors pharmaceuticals & biotechnology and chemicals, which together constitute more than 60% of the total R&D investment of the 449 companies in all ten sectors. The un-weighted expected changes per company for the next year and the next three years are considerably higher (around 10% p.a.), mainly because the smaller R&D investors in the sample tend to have higher R&D investment growth expectations.

The weighted growth expectations for R&D investment of around 5% p.a. represent a considerable improvement over recent years. At that growth rate, European companies would be doing at least as well as their US counterparts in terms of R&D investment for the first time in several years⁹. However, some factors may have biased this finding, e.g. that eventually more respondents with a positive outlook took part in the survey or that, after a period of decline, it is common to expect a positive turn¹⁰.

The expected R&D investment changes of the companies in the sample, together with the past changes of the corresponding sectors from the *2005 EU Industrial R&D Investment Scoreboard*¹¹, are shown in Figure 1 below.

Figure 1: Past and expected changes* in R&D investment and average R&D investment, by sector



* Expected changes are averages weighted by R&D investment.

** Average R&D investment growth as CAGR over the three financial years 2001-2004 for the whole sector.

Note: For the “EU independent company” sample with 285 cases after elimination of 8 outliers with expected changes of more than 100% for the next year.

Source: European Commission DG JRC-IPTS

⁹ See “Industrial Research Institute’s R&D Trends Forecast for 2006”, Research and Technology Management, 49, 1, January-February, 2006

¹⁰ the so-called “hockey-stick phenomenon”

¹¹ See “The 2005 EU Industrial R&D Investment Scoreboard”, European Commission, EUR 21851 EN, 2005

Although past and expected changes are not directly comparable, and while the survey is not fully representative of the Scoreboard, the figure reveals important sectoral differences. It shows four sectors where the expected R&D investment trends in the survey are higher than the past R&D investment growth of both EU and non-EU companies in the Scoreboard: support services, engineering & machinery, IT hardware and chemicals. The same is true considering only the EU companies in the Scoreboard in electronic & electrical equipment and food producers & processors. In steel & other metals, the past R&D investment growth for EU companies in the Scoreboard was higher than the expected changes in the survey. In health, the past R&D investment growth for EU companies in the Scoreboard was similar to that expected in the survey. The past R&D investment growth of both EU and non-EU companies in the Scoreboard was also higher than the expectations in the survey for automobiles & parts and pharmaceuticals & biotechnology. Thus, although the overall expectations for R&D investment in the survey suggest a recovery of R&D investment, there are important sectoral differences.

Also the average R&D investment volume per firm¹² (not shown in Figure 1 above) differs by sector. It is above average in the sectors pharmaceuticals & biotechnology, automobiles & parts and IT hardware and much lower than average in support services and food producers & processors.

The expected changes in R&D investment for the next year are around or above 5% for support services, engineering & machinery, pharmaceuticals & biotechnology and electronic & electrical equipment and less than 5% for the others. Expectations for chemicals for the next year are very low because one very big company expected a reduction of R&D investment. Despite that, the companies in the sector expect a small R&D investment growth for the next three years.

Expectations for the next three years are above 10% p.a. in support services as well as in engineering & machinery. While the companies in support services are relatively small and therefore dependent on their R&D activities for business growth, those in engineering & machinery are much bigger and the expectations of the companies in that sector are rather heterogeneous.

The importance of R&D in the pharmaceuticals & biotech sector is underlined by the high share of R&D investment in the responses, the biggest average R&D investment per firm and the considerable expected increases of R&D. Analogous to that, the support services companies, which provide services mainly to the pharmaceuticals & biotechnology sector, expect a growing role of R&D investment in the coming years. This may stem from an overall bigger role of R&D services provided to the pharmaceuticals & biotech sector.

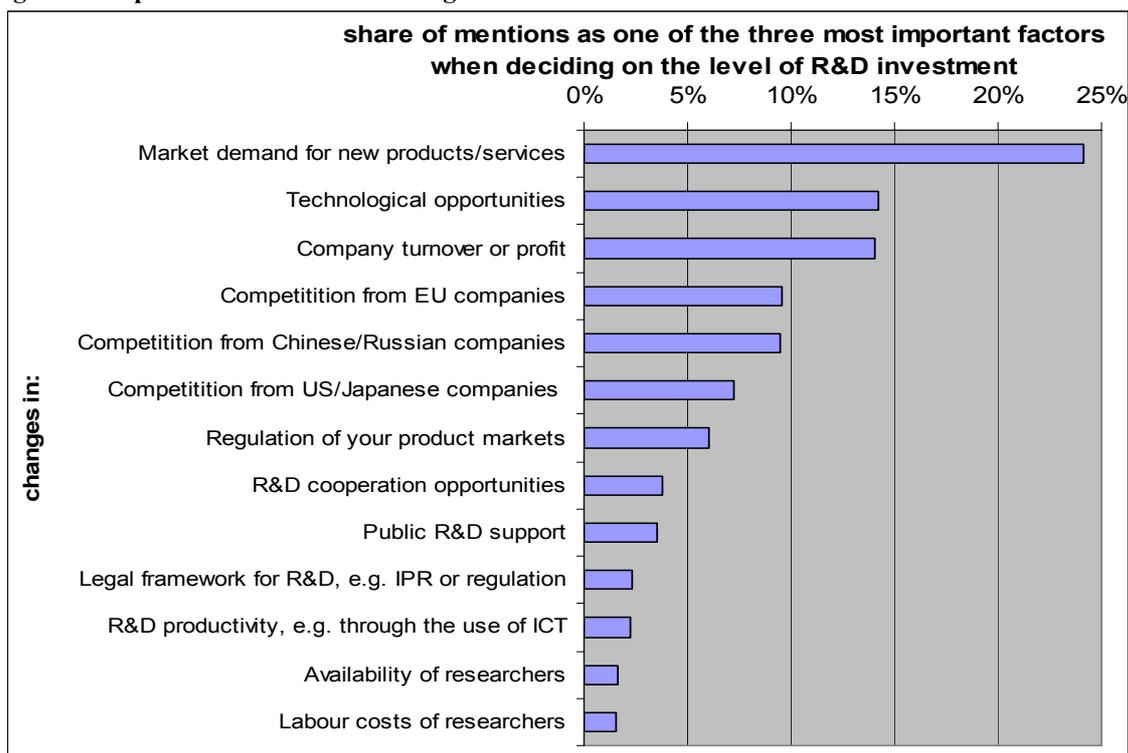
Except for the fact that they are smaller than the independent EU companies, the EU subsidiaries in the sample do not show considerable differences. R&D investment growth rates for the non EU subsidiaries are about one third smaller than for the EU companies. However, due to the relatively small number of non EU subsidiaries in the sample, it is not clear whether the reason for this is a different corporate policy or just a bias in that sub-sample.

¹² The averages are drawn up by relatively few companies which invest much more than their counterparts.

3 REASONS FOR INVESTING IN R&D

Reasons for deciding the level of R&D investment were addressed with respect to their importance (i.e. which is the most important factor) and their direction of influence (i.e. whether a factor makes the company invest less, the same, or more in R&D). The first aspect, importance, is shown in Figure 2 below and reveals that the R&D investment decision is mainly guided by three aspects: changes in market demand for new products and services, changes in technological opportunities and changes in the company's turnover or profit. The first two factors reflect the well-known role of market-pull and technology-push for R&D, while the third factor reconfirms the finding that own funds are the most important source of R&D investment¹³.

Figure 2: Importance of factors affecting the decision to invest in R&D



Note: Refers to 880 mentions for 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

Then, three competition factors follow¹⁴. Two of these three factors still have some importance for the decision how much to invest in R&D in the sense that almost 10% of the respondents mentioned them as an important factor. Changes in competition from Chinese or Russian companies are as important as changes in competition from EU companies. The whole group of the first six most important factors is market-related. The other seven factors concern framework conditions and are less important than the market related factors. The framework condition factors are changes in: regulation of your product markets, R&D cooperation opportunities, public R&D support, the legal framework for R&D or R&D productivity. Compared to the other factors, labour costs and availability of researchers play the least important role.

¹³ See Section 4: Sources of R&D Investment

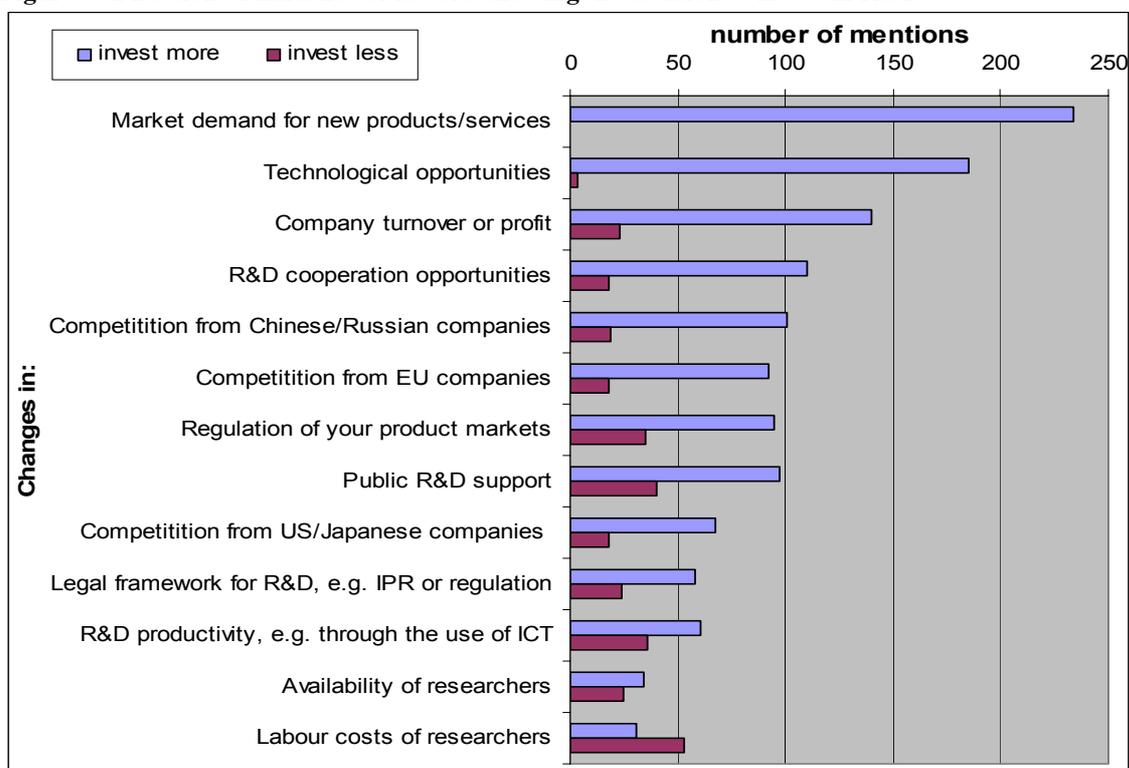
¹⁴ Changes in competition from companies located in: the European Union, emerging countries (e.g. China or Russia) or other industrialised countries (e.g. the US or Japan).

However, there are some sectoral differences¹⁵. Changes in technological opportunities play a special role for investing in R&D in automobiles & parts and electronic & electrical equipment.

For companies in the IT hardware sector, changes in competition and the company’s turnover are more important than for the other sectors. In health and pharmaceuticals & biotechnology, changes in regulation of the company’s product markets play an important role. It should be noted that, in the pharmaceuticals & biotechnology sector, changes in competition from EU and from US/Japanese companies are particularly unimportant. Changes in the labour costs and the availability of researchers are more important for pharmaceuticals & biotechnology than for the other sectors.

Direction of influence, which is the second aspect addressed together with the reasons for investing in R&D, is shown in Figure 3 below. There have been four times as many positive mentions (“invest more”) than negative ones (“invest less”). Changes in market demand and technological opportunities, in addition to being the most important factors for this decision, are also those with the strongest positive influence on the level of R&D investment. No respondent claimed that changes in market demand would lead the company to invest less in R&D¹⁶.

Figure 3: Direction of influence of factors affecting the decision to invest in R&D



Note: The factors are sorted by the balance of the number of mentions “invest more” and “invest less”. Refers to for 293 cases in the “EU independent company” sample, for which a total of 1617 mentions were made.

Source: European Commission DG JRC-IPTS

These two factors are followed by nine other factors which on the balance constitute a smaller and decreasing incentive to invest more in R&D, ranging from changes in company turnover or profit to changes in R&D productivity. At the bottom of the list, the availability of researchers seems to have a slightly positive influence, while changes in labour costs of researchers have a slightly negative influence on the decision to invest in

¹⁵ See Annex B: Figures by Sector

¹⁶ A considerable number of mentions stated that the company would invest the same in R&D, i.e. the given factor is neutral for the company’s R&D investment behaviour. The number of mentions saying “invest the same” was similar for all factors except for market demand, where the number of such statements was very low. This indicates an even more positive influence of market demand of new products/services for the level of R&D investment.

R&D. This suggests that labour costs, while not among the most mentioned factors, are not insignificant in deciding on how much to invest in R&D.

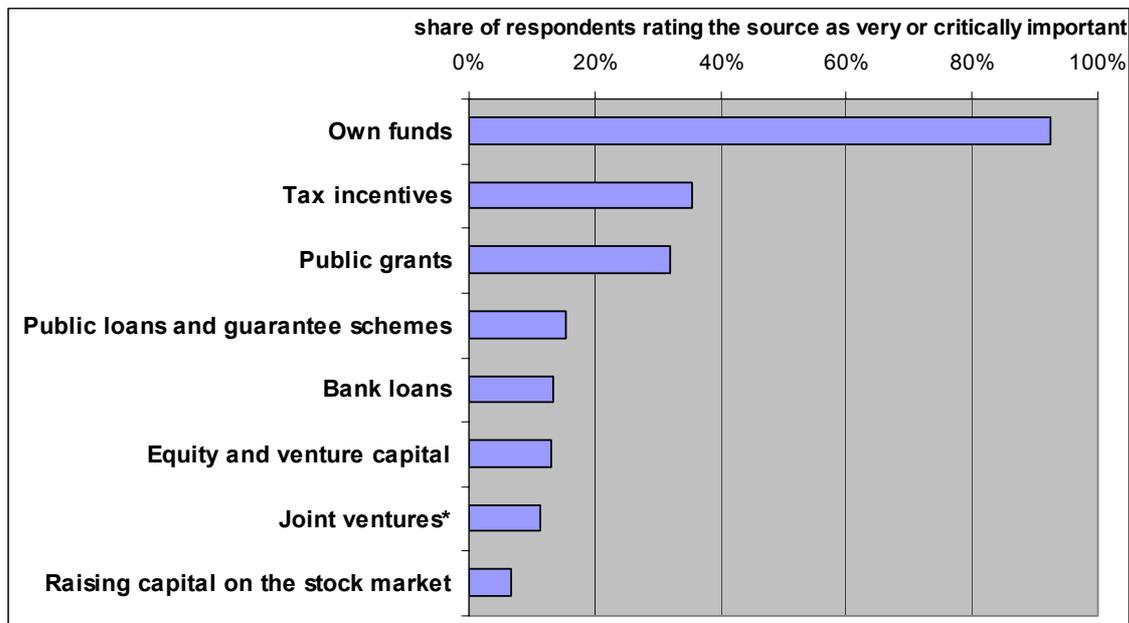
In chemicals and pharmaceuticals & biotech, changes in the legal framework for R&D and public R&D support are seen as stronger factors influencing the company to increase or decrease R&D than in the other sectors. Together with engineering & machinery, changes in product market regulation and R&D cooperation opportunities are perceived by these sectors as a factor with a positive influence on the decision how much to invest in R&D. For companies in the steel & other metals sector, competition from companies located in emerging countries, e.g. China or Russia, is an over-proportionally strong incentive to invest more in R&D.

The picture for the samples of EU and non-EU subsidiaries is generally similar to that for the independent EU companies. The only difference is that, for the EU subsidiaries, three factors have a negative impact on the decision how much to invest in R&D: changes in R&D productivity, product market regulation and labour costs of researchers. This is mainly due to the statements from subsidiaries in the chemicals sector.

4 SOURCES OF R&D INVESTMENT

For the companies in the sample, own funds are considered to be by far the most important source for financing the company’s R&D¹⁷. Tax incentives and public grants rate second and third. Public loans and guarantee schemes, bank loans, equity and venture capital and joint ventures are considered much less important. Raising capital on the stock market plays a relatively small role. This is summarised in Figure 4 below.

Figure 4: Sources of R&D funds



* “Joint ventures” refers to a situation where funds for joint R&D projects are also provided by project partners, so that the company does not finance this project fully on its own.

Note: The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

A sector-by-sector analysis¹⁸ shows that, despite the fact that own funds play the most important role in all sectors, they are relatively less important in some sectors and substituted by other sources. For example, in steel & other metals, own funds are mainly substituted by public grants and tax incentives. In support services, public funds for R&D (public grants, tax incentives and public loans and guarantee schemes) are also used, but relatively often combined with access to equity and venture capital. There are no considerable differences in the sources of funding with respect to the EU and non-EU subsidiary samples.

¹⁷ The importance of own funds becomes even more evident when taking into account that equity and venture capital and raising capital on the stock market are in fact sub-categories of own funds.

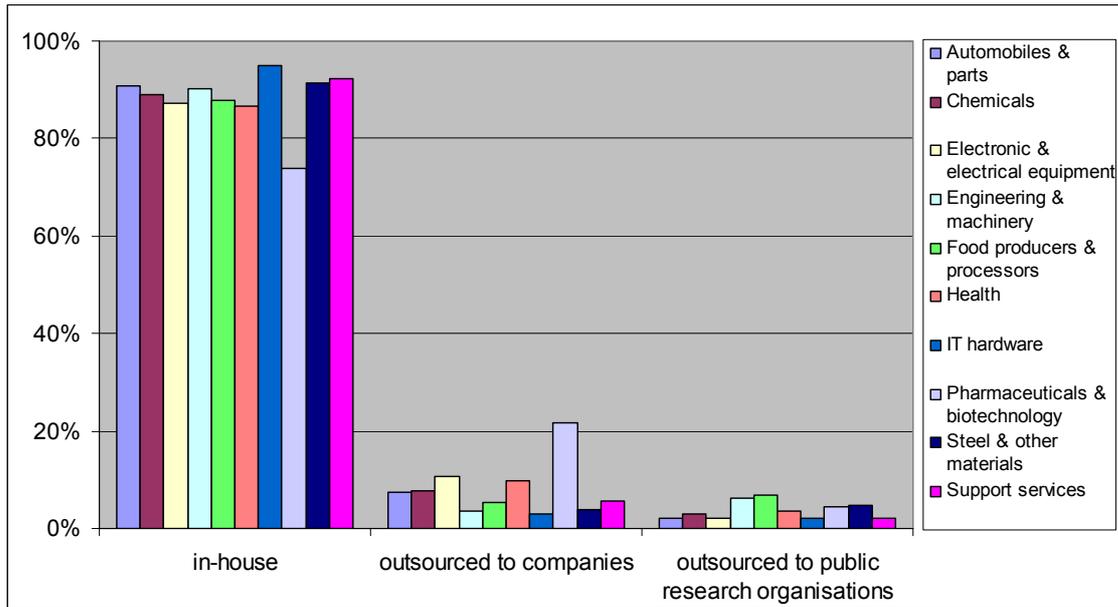
¹⁸ See Annex B: Figures by Sector

5 IN-HOUSE R&D AND OUTSOURCING

A high proportion of companies¹⁹ use external resources to complement their internal R&D. Weighted by R&D investment, the respondents outsource an average of 18% of their R&D activity²⁰. Around two thirds of the outsourced R&D goes to other companies and one third to public research organisations.

Using unweighted figures, a slightly smaller proportion of R&D is performed in-house, indicating that the larger R&D investors in the sample tend to do more of their R&D in-house than the smaller ones. An overview of the levels of in-house and outsourced R&D is shown in Figure 5.

Figure 5: Degree of in-house and outsourced R&D by sector



Note: The levels reported here are weighted averages. The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

The figure reveals that companies from pharmaceuticals & biotech tend to do less of their R&D in-house. They outsource twice the share of R&D to other companies than their counterparts. In our sample the companies in the support services sector are mainly providers of R&D services to the pharmaceuticals & biotech sector. Further, the companies in the support services sector are those with the highest number of companies which do R&D exclusively in-house (this is not shown in figure 5 above).

There are no considerable differences with respect to in-house R&D and outsourcing to the EU and non EU subsidiary samples.

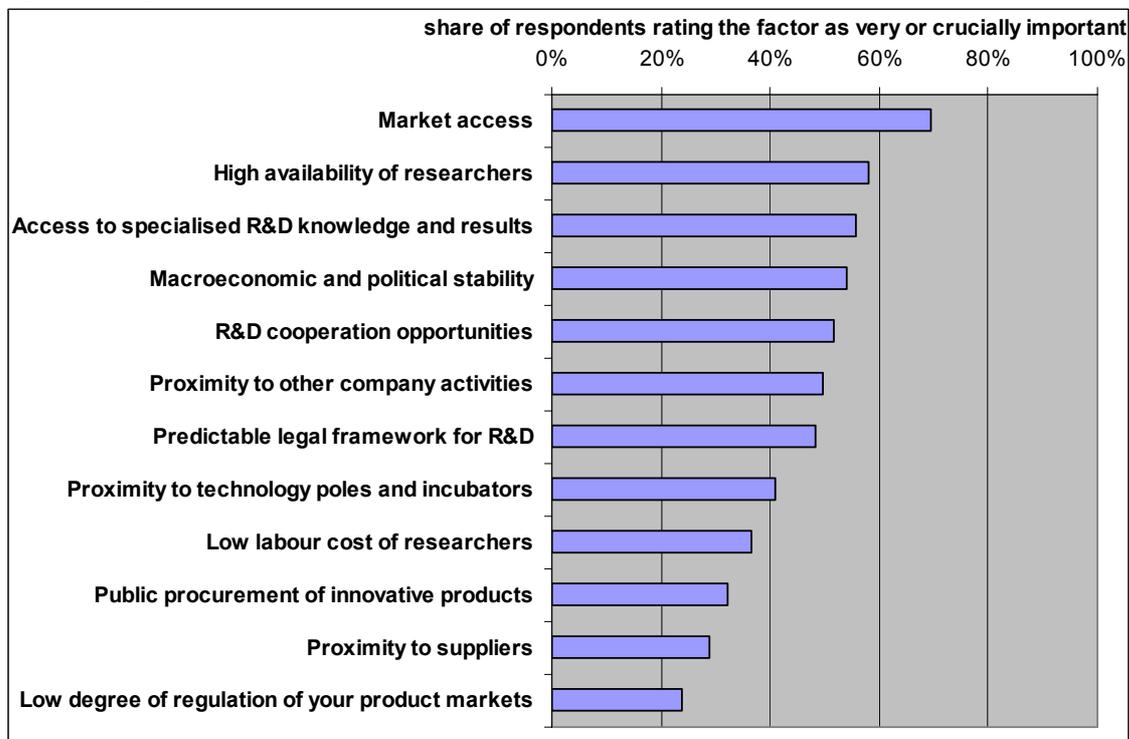
¹⁹ Nine out of ten respondents outsource R&D.

²⁰ This figure is similar to, perhaps a bit higher than, the figure of around 15 % reported in other recent studies on the level of outsourcing, see e.g. EIRMA: “Responsible Partnering: Joining Forces in a World of Open Innovation”, European Industrial Research Management Association, January 2005

6 CHOICE OF R&D INVESTMENT LOCATION

The respondents made statements about twelve factors for locating or increasing some of the company’s R&D investment in a country other than its home country. The importance of location factors is shown in Figure 6 below.

Figure 6: Importance of location factors



Note: The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

The answers can be split into three groups. The first group consists of market access as the most important factor with more than two thirds of the respondents rating it very or crucially important in all sectors. The second group contains seven other factors which have some importance²¹ for the choice of the R&D investment location: high availability of researchers, access to specialised R&D knowledge and results, macroeconomic and political stability, R&D cooperation opportunities, proximity to other company activities, a predictable legal framework for R&D and proximity to technology poles and incubators. The factors in the third group have less importance²²: low labour costs of researchers, public procurement for innovative products, proximity to suppliers and a low degree of regulation of the company's product markets. It stands out that the often mentioned labour costs of researchers seem to be less significant compared to many other factors.

A sector-by-sector analysis²³ shows that market access as a location factor for R&D investment is less important for IT hardware than for the other sectors. A high availability of researchers and access to specialised R&D knowledge and results are very or crucially important for more than two thirds of the respondents in IT hardware as well as pharmaceuticals & biotechnology, which suggests that these sectors are “hungry for knowledge”.

²¹ “Some importance” means that the factor is very or crucially important for more than 40 % but less than 60 % of the respondents.

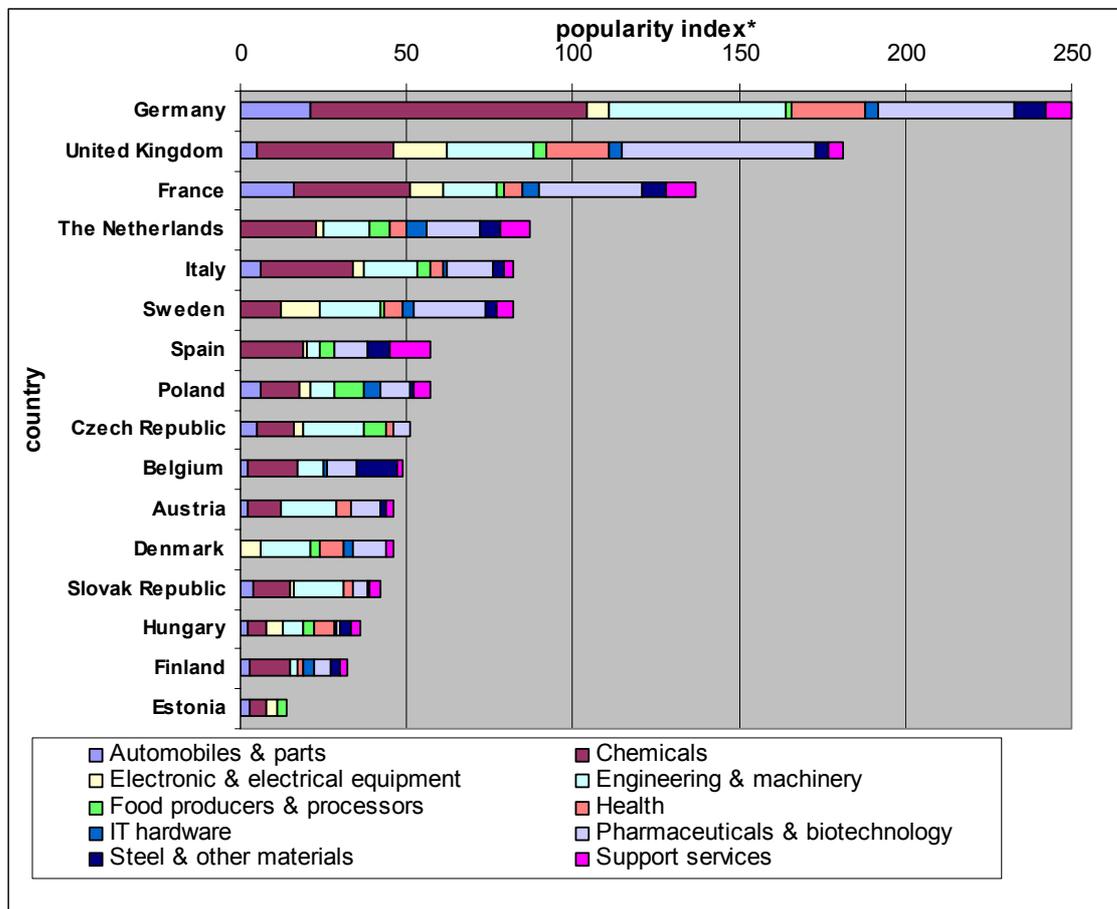
²² “Less importance” means that the factor is very or crucially important for more than 20 % but less than 40 % of the respondents.

²³ See Annex B: Figures by Sector

Five of the location factors analysed in this section were also examined with regard to their role in the decision how much to invest in R&D²⁴. The availability of researchers and R&D cooperation opportunities are somewhat important for the choice of location but much less important for the decision how much to invest in R&D. The most obvious interpretation is that these two factors matter when locating new facilities, but become a boundary condition on the level of R&D investment once the facilities have been established. Product market regulation has some importance for the decision to invest in R&D but none for the choice of location, which means that it may play the role of an incentive to invest more in R&D but not attract R&D investment to a specific location. The legal framework for R&D and labour costs of researchers have a rather low impact both for the R&D investment decision and the choice of location.

An important aspect in location is the choice of a country. The respondents, all from companies based in the EU, were asked to rank countries by their attractiveness for R&D investment in two separate groups. The results for the EU country group include the possibility to choose the home country and are shown in Figure 7 below.

Figure 7: Popularity index* of EU countries to locate R&D investment (including the home country)



* Based on a popularity index for 1249 statements for 293 cases in the “EU independent company” sample: Countries ranked as most favourable = 3 points, as 2nd = 2 points, as 3rd = 1 point.

Note: Includes only countries mentioned at least five times.

Source: European Commission DG JRC-IPTS

Overall, Germany, the United Kingdom and France form a group of the three most favoured countries, followed by the Netherlands, Italy and Sweden. In more than 60% of the cases, the firms stated their home country as one of the three most attractive

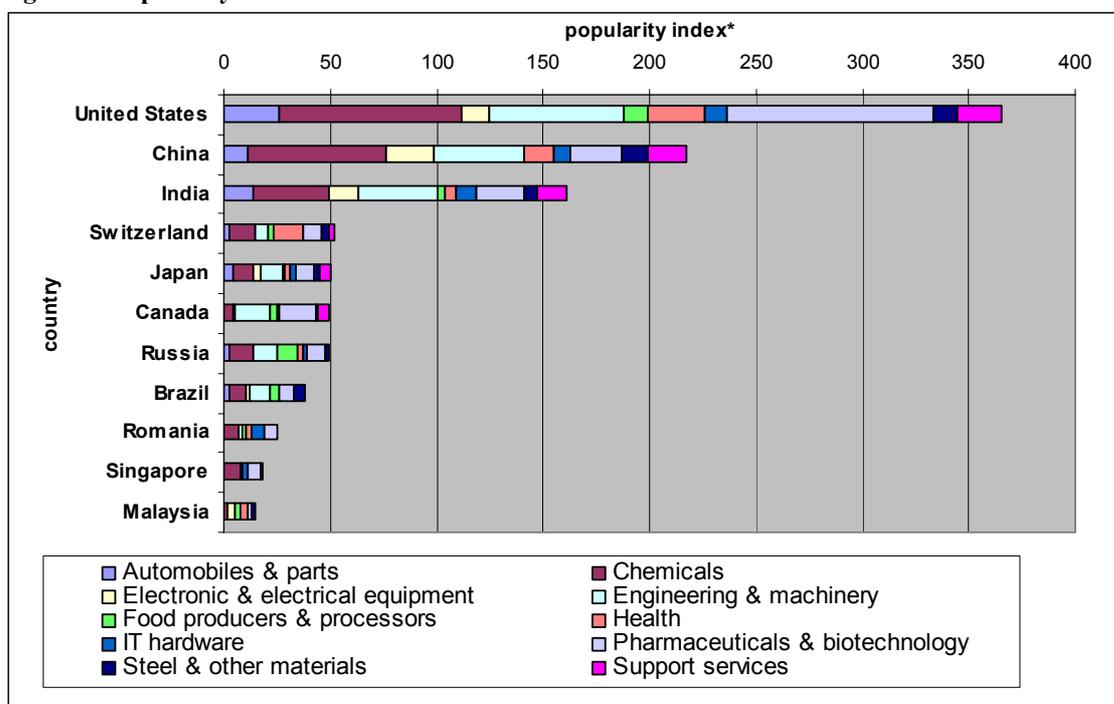
²⁴ See Section 3: Reasons for Investing in R&D

locations²⁵. Underlying reasons for the preference of the home country may be geographic proximity to other company sites or familiarity with the national socio-economic environment. When eliminating the home base as a possible choice, the New Member States of the EU gain over-proportionally in weight but do not enter the top five. It seems that, while companies prefer to choose an R&D location within their country, this location is then subject to the same R&D strategy like any other company site outside the home-country.

By sector, the figure reveals that many countries are strong over all sectors. Often, the preferred choice is a country with sector specific clusters like in Germany and France for automobiles & parts. Electronics & electrical equipment prefer the United Kingdom and Sweden. Engineering & machinery is relatively well distributed over all countries. However, it should be re-emphasised that the statements are related to the home country in the majority of the cases.

Regarding the preferred location outside the EU, a group of three countries can be distinguished. The United States, China and India had the highest popularity index. This is shown in Figure 8.

Figure 8: Popularity index* of non-EU countries to locate R&D investment



* Based on a popularity index for 1039 statements for 293 cases in the “EU independent company” sample: Countries ranked as most favourable = 3 points, as 2nd = 2 points, as 3rd = 1 point.

Note: Includes only countries mentioned at least five times.

Source: European Commission DG JRC-IPTS

The high preference for the US and the difference in preference for the first three countries with respect to the others are noticeable. A recent study suggests that the drivers behind these preferences are country-specific²⁶. For the US, drivers of R&D investment are mostly a combination of technology clusters/academic institutes and markets/customers²⁷. For China, the main drivers are markets/customers and a low-cost skill base. The latter is also a main driver in India, together with the qualification of workers.

²⁵ A similar proportion (58%) of respondents to a recent survey stated that they do not offshore R&D and do not plan to do so in the future (see: “CEO Briefing: Corporate Priorities for 2006 and Beyond”, The Economist Intelligence Unit, 2006)

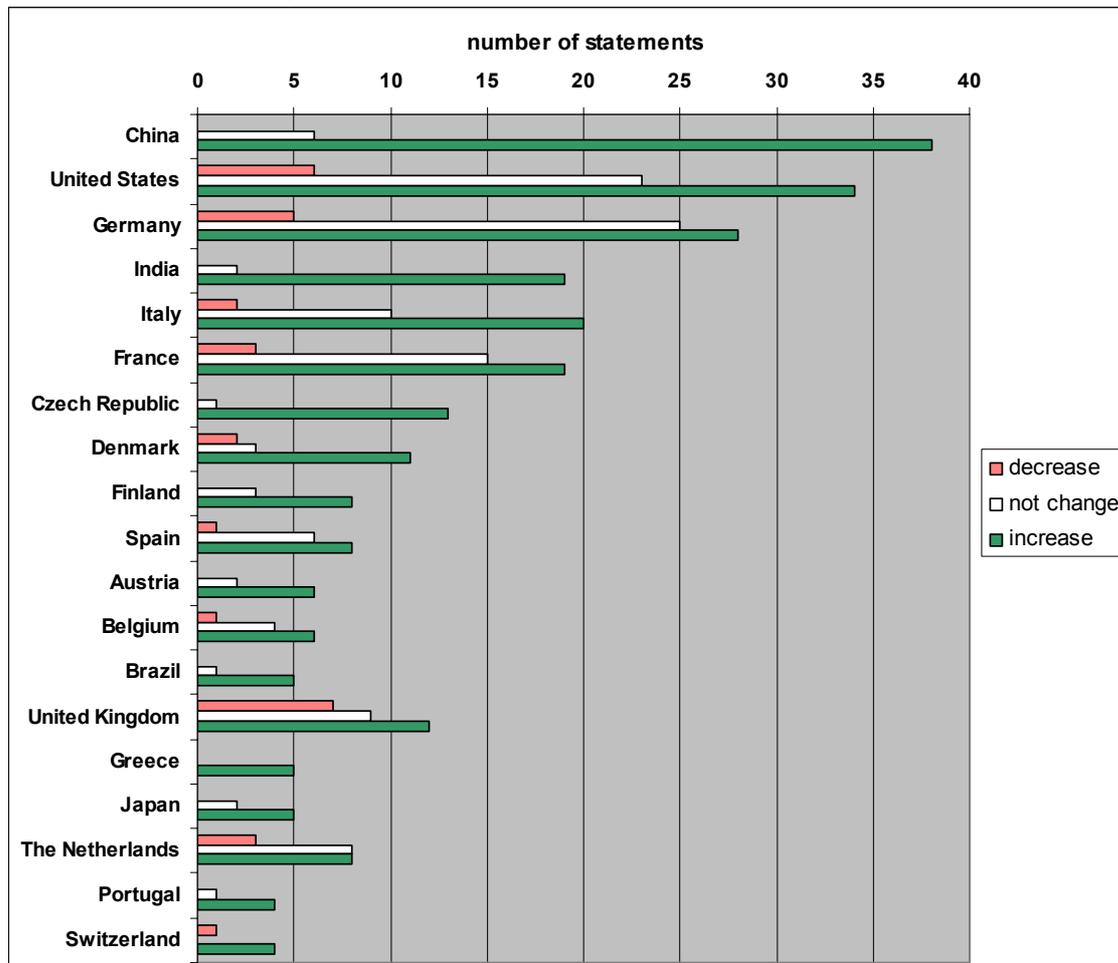
²⁶ See “Innovation: Is Global the Way Forward?”, Booz Allen Hamilton and Insead, 2006

²⁷ See Section 3: Reasons for Investing in R&D, where market demand for new products/services is the most important reason to invest in R&D.

Pharmaceuticals & biotechnology companies have some preference for the US. Engineering & machinery and pharmaceuticals & biotechnology show some preference for Canada.

In addition to the attractiveness for location, the respondents also made statements about the expected development of R&D activity and personnel within the next three years at the company's present or future locations. The statements for R&D activity are shown in Figure 9 below.

Figure 9: Expected changes in R&D activity at the company's present or future locations for the next three years



Note: For 222 statements for 293 cases in the “EU independent company” sample: most favourable country = 3 points, 2nd = 2 points, 3rd = 1 point. Includes only countries mentioned at least five times. The countries are ordered top-down by intensity (number of statements) and clarity (unanimity of statements).

Source: European Commission DG JRC-IPTS

The expected trends for R&D activity are mainly positive with relatively few statements indicating decrease. Like for the preferred R&D investment location in many cases the home country is mentioned in the trend statement. It can therefore be assumed that the trends for EU countries are, to a large degree, expectations for real cases in the home country of the company.

Trends are most positive for China, the United States and Germany, followed by India, Italy and France. For India and China there are far more respondents expecting an increase in R&D compared with the United States, Germany and France, where there is a considerable number of statements which expect R&D investment not to change.

Somewhat fewer positive statements were given for the Czech Republic and Denmark, while the number of statements for the remaining countries is relatively low. For the

United Kingdom, the difference between positive and negative statements is relatively small compared to the total number of statements.

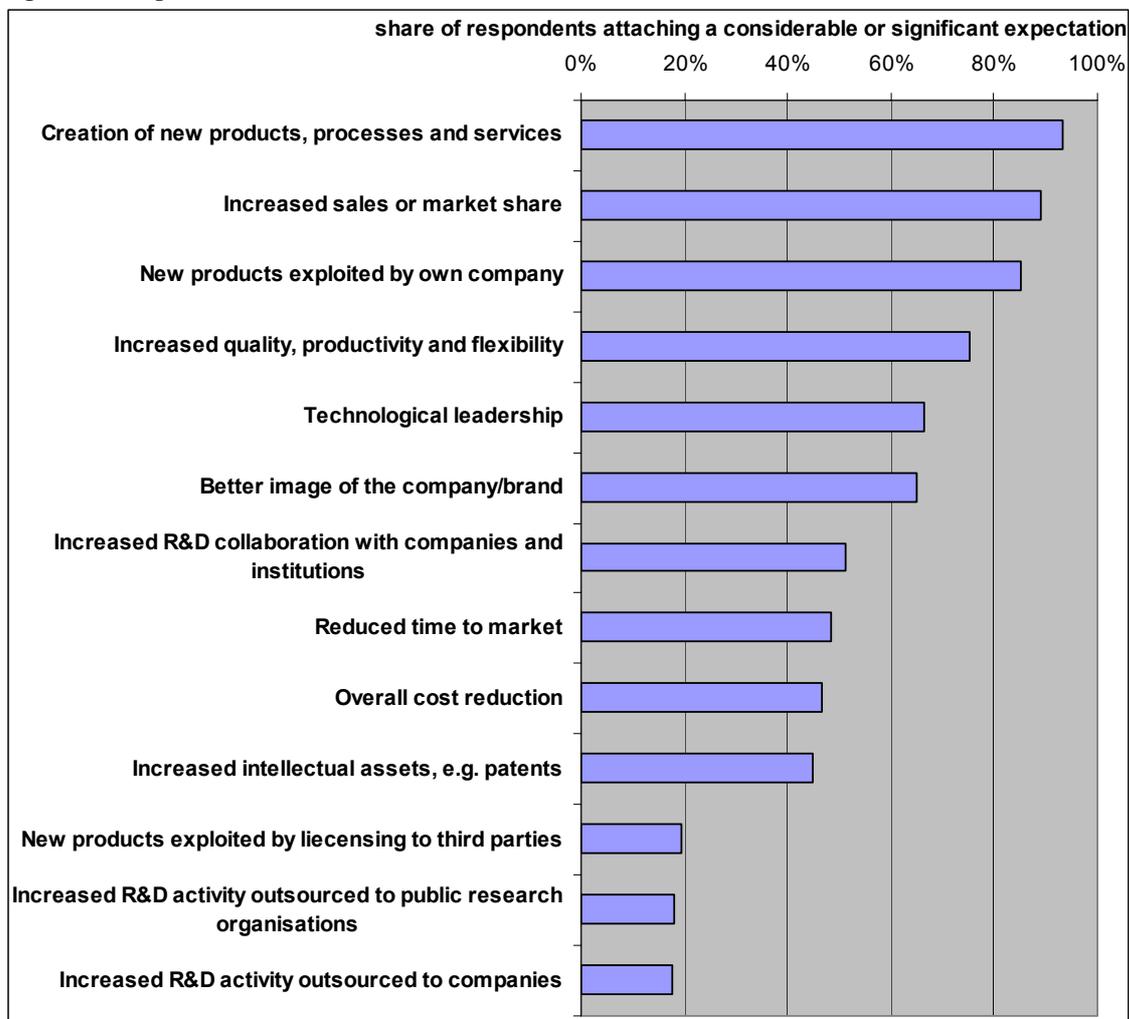
Given the present discussions about the role of emerging countries like China and India in R&D internationalisation it is surprising to note that this survey reveals relatively few difference between trend statements of these and the other countries. Some countries that were mentioned as a preferred location are not mentioned with the same frequency with respect to expected changes in R&D activity (e.g. Poland or Canada). A reason for this may be that the respondents related the question about R&D increases to concrete present or future locations while perceiving the question about locating R&D investment in a more hypothetical way not related to a concrete present or planned case.

There is a statistically significant correlation between replies for trends in R&D activity and R&D personnel. This merely underlines the fact that a substantial part of R&D investment is required to pay for the human resource. However, we cannot say from this study whether R&D is tending to become a more or less capital intensive activity.

7 OUTCOMES FROM R&D INVESTMENT

For the companies in the sample, the main expectations from R&D are the creation of new products, processes and services, increased sales or market share, and the exploitation of new products from R&D by the company itself²⁸. The expectations from R&D investment are shown in Figure 10 below.

Figure 10: Expected outcomes of R&D investment



Note: The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample: most favourable country = 3 points, 2nd = 2 points, 3rd = 1 point. Includes only countries mentioned at least five times.

Source: European Commission DG JRC-IPTS

Considerable expectations²⁹ as outcomes from R&D investment are attached to increased quality, productivity and flexibility, technological leadership and a better image of the company or brand. Some expectations³⁰ are related to carrying-out R&D in increased collaboration with companies and institutions, reduced time to market, overall cost reduction and increasing intellectual assets (e.g. patents). The exploitation of new products by third parties through licensing and increased outsourcing R&D activities to public research organisations and companies play a minor role.

²⁸ “Main expectation” means that more than 80 % of the respondents attach a considerable or significant expectation to this factor as an outcome of R&D investment strategy.

²⁹ “Considerable expectation” means that more than more than 60 % but less than 80 % of the respondents attach a considerable or significant expectation to this factor as an outcome of R&D investment strategy.

³⁰ “Some expectations” means that more than more than 40 % but less than 60 % of the respondents attach a considerable or significant expectation to this factor as an outcome of R&D investment strategy.

This means that the responding companies generally do not undertake R&D for other parties, which confirms that R&D is considered a strategic core activity³¹.

A sector by sector analysis³² shows the relative importance of licensing to third parties for the companies in the support services sector, which produce R&D results for pharmaceuticals & biotechnology companies. For the IT hardware sector, technological leadership, reduced time to market and increased intellectual assets are main outcomes of R&D investment. For engineering & machinery and steel & other metals, R&D provides a better image of the company or brand. For the latter sector, increased R&D collaboration is relatively important.

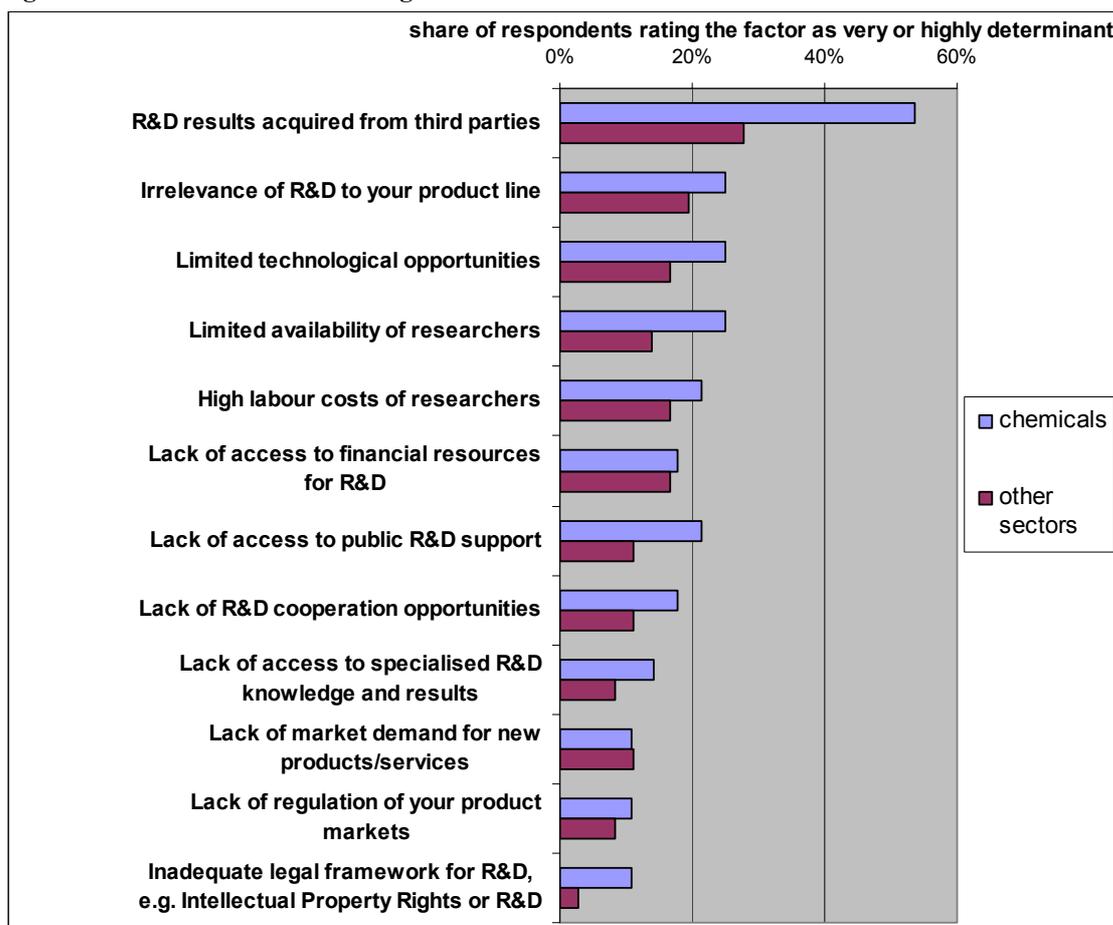
³¹ See Section 5: In-house R&D and Outsourcing

³² See Annex B: Figures by Sector

8 REASONS FOR NOT INVESTING IN R&D

A total of 64 companies which, at the time of the survey, did not invest in R&D stated the reasons for that. These companies are not among those analysed in the previous sections of this document³³. 28 out of the 64 companies are in the chemicals sector and the rest in thirteen other sectors. The weight of the reasons for not investing in R&D is shown in Figure 11. It should be noted that, on average, the respondents made more moderate statements to this question than to the others, maybe because of its intrinsic negative formulation³⁴.

Figure 11: Reasons for not investing in R&D



Note: The factors are sorted by how determinant they were on average. Refers to the 64 companies not investing in R&D nor planning to do so in the future.

Source: European Commission DG JRC-IPTS

The figure reveals a slightly different profile of the chemicals sector compared to the other sectors. For chemicals, acquiring R&D results from third parties is by far the main reason for not investing in R&D. It is followed by a group of factors stated by at least one fifth of the responses, which suggests that they play some role for not investing in R&D, namely irrelevance of R&D to the company's product line, limited technological opportunities, limited availability and high labour costs of researchers, and lack of access to public R&D support.

³³ See Annex A: The Methodology of the Pilot Survey

³⁴ The exact formulation of the question is: "If you don't invest in R&D nor plan to do so in the future, how determinant are the following factors for this decision?" (see also Annex C: The Questionnaire on Research and Development Investment)

In the other sectors, acquiring R&D results from third parties is also the main reason for not investing in R&D, but the difference to the other factors is not as strong as in chemicals. This factor is followed by irrelevance of R&D to the company's product line. The other factors play a minor role.

Comparing the factors for not investing in R&D to the reasons that make companies invest in R&D³⁵ reveals no direct relation between them. However, the differences in the rankings indicate that it may rather be a lack of technological opportunities than a lack of market demand that prevents companies from investing in R&D. Further, the factors limited availability and high labour costs of researchers are placed relatively higher among the reasons for not investing in R&D, which suggests that they are of some concern to the respondents.

9 FREQUENTLY CITED SUGGESTIONS

A large number of suggestions from the respondents call for a European patent, the strengthening of European competitiveness in the light of competition from emerging economies, e.g. China, stronger links between science and the business sector and the support of innovation, also with respect to its links with R&D.

Some suggestions underline the importance of providing R&D support measures tailored to the existing industrial structures. Also the link between production and R&D and the lack of R&D support for medium size companies is highlighted, for which it is often not possible to get access to programs tailored to big companies. Further statements call for funding of fundamental research through the EU and underline the role of mobility of researchers. Another suggestion is to make the access to the European Commission's R&D funds, especially the Framework Programme, easier and less bureaucratic.

³⁵ See Section 3: Reasons for Investing in R&D

10 ANNEX A: THE METHODOLOGY OF THE PILOT SURVEY

10.1 Background and Approach

A mapping of the available information on industrial R&D at individual country level¹ revealed the main sources of data to be the official R&D, innovation, and some occasional country-specific statistics. Private sources exist but are published in very few cases. In particular, the shortage of qualitative and prospective information on industrial R&D was confirmed. Another mapping and analysis of available trans-national data sources on industrial R&D², from the European Commission, OECD and European industry associations, showed that data on business enterprise R&D is essentially based on retrospective surveys and involves differing approaches. Statistical offices generally collect R&D data in the form of Business Expenditure on R&D (BERD) according to a top-down view and definition of R&D. Surveys by industrial associations are undertaken sporadically with limited scope and disclosure of results. The industry perspective taken in such surveys does not permit cross-sector or cross-country comparisons.

This survey tackles the information gap identified above through an approach at the European level to gather qualitative information on factors and issues surrounding and influencing current and prospective R&D investment strategies in companies.

The specificity of the information needed made it necessary to generate primary data through a self-administered questionnaire under three main headings: R&D investment levels and trends; R&D location strategy and management; and outcomes of R&D investment strategy.

The survey explicitly avoids duplication with other R&D investment related surveys and data collection exercises (e.g. Innobarometer, the Trend Chart on Innovation, the results from the Knowledge Economy Indicators project³, EUROSTAT's data collection of structural indicators or other ongoing surveys).

10.2 R&D Investment Definition

The objective of the survey is to address R&D investment, and not R&D expenditure, due to its direct link to the Barcelona targets. In order to avoid a straightforward rejection of the questionnaire and make its completion as easy as possible, only a short definition of R&D investment, which is as close as possible to accounting standards, is provided. The definition refers mainly to the R&D reported in the company's most recent accounts. The definition used in the questionnaire is thus closely related to the International Accounting Standard (IAS) 38 "Intangible Assets"⁴, which is based on the OECD "Frascati" manual⁵, and the definition used in the EU Industrial R&D Investment Scoreboard.

¹ See the results of the European Science and Technology Observatory (ESTO) study: "Mapping Surveys and other data sources on Industrial R&D in the EU-25 countries", Seville, June 2004

² See the results of the JRC-IPTS study: "Description of Information Sources on Industrial R&D data : European Commission, OECD and European Industry Associations", Seville, July 2004

³ See <http://kei.publicstatistics.net/index.html>

⁴ See <http://www.iasplus.com/standard/ias38.htm>

⁵ See "Proposed Standard Practice for Surveys on Research and Experimental Development: Frascati Manual", OECD, Paris, 2002, <http://www1.oecd.org/publications/e-book/9202081E.PDF>

10.3 Sector Classification

The responses were classified in the FTSE sector⁶ corresponding to the sector indicated in the questionnaire. Sector classifications of individual companies were cross-checked with information appearing in the *2005 EU Industrial R&D Investment Scoreboard*. In case of a conflict between the classification in the Scoreboard and the indication of the respondent, the final classification was decided on a case-by-case basis⁷.

Then, the equivalent NACE sector was assigned to each company on a case-by-case basis using an internal preliminary equivalence table between FTSE and NACE. However, in order to maintain a close relationship to the Scoreboard, the analysis presented here is based on the FTSE sectors. Unless mentioned otherwise, weighted figures presented in this report are weighted by R&D investment.

10.4 Sample Composition

Three different channels for approaching firms were tested:

- a) The questionnaire was directly sent to the 500 European companies appearing in the *2004 EU Industrial R&D Investment Scoreboard*⁸ together with a cover letter, which also included a link to the website of the questionnaire.
- b) Firms were also approached indirectly through five industrial associations by letter, email and telephone:
 - European Industrial Research Management Association (EIRMA)
 - European Council for Automotive R&D (EUCAR)
 - European Association of Automotive Suppliers (CLEPA)
 - European Association for Bioindustries (EuropaBio)
 - European Federation of Pharmaceutical Industries and Associations (EFPIA)

The associations were asked to inform their members about the survey and direct their attention to the questionnaire website.

- c) A quantitative sample of 6100 companies in three sectors according to sample composition criteria for the 25 EU Member States was compiled:
 - 3092 companies in pharmaceuticals & biotechnology,
 - 1499 companies in chemicals, and
 - 1509 companies in engineering & machinery.

These sectors were selected because of their role for R&D investment in terms of size and growth as well as data availability according to the sample composition criteria. The sample composition criteria included size, geographic location and hierarchical level of the contact person with the company. The questionnaire was directly sent to the companies together with a cover letter, which included a link to the website of the questionnaire.

The companies were addressed at the CEO level and received a reminder shortly after the first deadline.

⁶ The Scoreboard contains 31 sectors of the FTSE global classification system. By 31 December 2005, the FTSE classification system has been replaced by the ICB Industry Classification Benchmark (see: http://www.icbenchmark.com/docs/ICB_StructureSheet_120104.pdf)

⁷ However, this happened only in one case where the company was finally classified into the same sector as in the Scoreboard.

⁸ See <http://EU-IRIScoreboard.jrc.es/>

10.5 Composition of the Responses

In the end, 583 responses were received. These 583 responses correspond to an overall response rate of 8.8%⁹ by number; but substantially more in terms of proportion of total European R&D¹⁰. By channel and sector, the response rates are as follows (number of responses in brackets)¹¹:

- a) A response rate of 19% among the 500 European companies of the 2004 EU Industrial R&D Investment Scoreboard (95 responses).
- b) Given the fact that the letter was forwarded among the members of the industrial associations, the basic population of this group is unknown and their response rate cannot be calculated (33 responses).
- c) Although the questionnaire of the quantitative sample was originally sent only to companies in the three chosen sectors, 118 companies from other sectors responded. Reasons for this are that companies stated a different main sector in their response than the one originally in the contact database or that questionnaires were forwarded to other units than that originally addressed. The remaining 337 responses by sector lead to the following response rates:
 - 2.6% in pharmaceuticals & biotechnology (81 responses),
 - 10.1% in chemicals (152 responses),
 - 6.9% in engineering & machinery (104 responses).

The very low response rate in the sector pharmaceuticals & biotechnology and the relatively high response rate in chemicals stand out. However, it should be mentioned that much higher response rates for the three sectors were expected at the outset of this study: 13,8% for pharmaceuticals & biotechnology and 17% for chemicals and engineering & machinery. However, this did not take into account that questionnaires were forwarded within the company to units in other sectors or that companies classified themselves in different sectors than that of the contact database.

In this sense, the number of responses from pharmaceuticals & biotechnology did not reach expectations, but this can at least partly be explained by limits of data availability¹² and a much smaller average size¹³ of the companies in this sector compared to the others. Although the response rates for chemicals and engineering & machinery were also much lower than those expected, probably a considerable number of respondents from other sectors was reached through contacts in these sectors.

It should be added that self-completion questionnaires are always subject to a self-selection bias and that there may be an additional bias in the R&D investment amounts because it is not known whether the figures stated in the responses are audited.

As a first step, the 583 responses were filtered according to R&D activity:

- The 519 companies investing in R&D are the main focus of the analysis presented here,
- Some findings for the 64 companies not investing in R&D are shown in Section 8: Reasons for not Investing in R&D.

⁹ This is a value often found for similar surveys in literature.

¹⁰ The overall R&D investment amount stated by the respondents is more than 25 % of the total R&D investment of the European Scoreboard companies.

¹¹ Before reclassification of companies by FTSE sector, see section 10.5 Composition of the Responses

¹² With more than 3 000 addresses requested for this sector even with the very large data databases used it was very difficult to compile the contact data in the necessary size and country composition.

¹³ It is a common experience that smaller firms have a lower tendency than bigger ones to respond to surveys.

The responses were not filtered by the job title of the respondent as different company cultures have different policies regarding who is considered to answer a letter. Some may be more inclined to give the true position while in others the answer may be given on behalf of the person to whom the letter was addressed.

Then, the responses were examined for the type of organisation they represent. Five responses from research labs were excluded from the further analysis as the results should refer to companies only.

The remaining 514 responses were then filtered by the organisational unit the response came from. In the case of multiple responses from different organisational units within the same company, each response is regarded as the statement for the organisational unit indicated in the questionnaire whenever there was no overlap between the organisational units. These responses are not consolidated because, despite being part of the same company, they regard the different organisational units indicated in the responses, which are taken as if they were individual firms¹⁴. Because of the lack of overlap between the organisational units, there is no double-counting of R&D investment amounts.

In the case of multiple responses from different organisational units within the same company, responses were consolidated whenever there was an overlap between the organisational units in order to avoid double-counting of R&D investment amounts. For five companies each, two answers from the same organisational level and similar job titles were received. Interestingly, the answers are so similar that, for each company, only one of the two was included in the response; it was not necessary to calculate an average. After this step, the 509 companies left were examined by company type. The following types of companies can be distinguished:

- **“Independent EU companies”** are those which were identified as not being controlled by another one at the time of the survey. These companies are all located in the EU. The 329 independent EU companies constitute almost 90% of R&D investment of all companies in the sample.
- **“EU subsidiaries”** are companies identified as a subsidiary of another EU company at the time of the survey. These 132 companies are all located in the EU and their parents are companies located in the EU as well. They make up for about 5% of R&D investment of all companies in the sample.
- **“Non EU subsidiaries”** are companies identified as a subsidiary of a non EU company at the time of the survey. These companies are all located in the EU and their parents are companies located outside the EU. They constitute less than 5% of R&D investment of all companies in the sample. Although only EU companies had been addressed at the outset, 11% of the responses come from companies whose ultimate parent was located outside the EU. This is the result of the industrial structure; namely cases where it was not possible to identify the location of the ultimate parent company through the available contact information. Most of the 48 non-EU companies are large¹⁵, only three are smaller (two medium- and one micro-size) and therefore eliminated from the sample. Of the remaining 45 companies in the non EU sample, there are four responses from independent companies, which are excluded from the sample, too. Among the remaining 41 subsidiaries there are two located outside the EU, which are also not considered for the sample. Thus, the non EU subsidiary

¹⁴ This is the case for two companies for which a total of six answers were received.

¹⁵ According to the Eurostat definition:

Category	Headcount	Turnover	or	Balance sheet total
Medium-sized	< 250	≤ € 50 million		≤ € 43 million
Small	< 50	≤ € 10 million		≤ € 10 million
Micro	< 10	≤ € 2 million		≤ € 2 million

sample contains the remaining 39 subsidiaries of non EU companies which are all located within the EU. For 24 out of these 39 cases, the headquarters are located in the US, in eight cases in Japan, in four cases in Switzerland and in one case each in Bermuda, Canada and Kuwait.

After this step, 500 companies are left for the analysis. Table 1 shows their main characteristics in the three subsets “EU independent company”, “EU subsidiary” and “non EU subsidiary”.

Table 1: Main characteristics of the 500 companies in the three subsets

Indicator	EU		Non EU subsidiaries
	independent	subsidiaries	
Number of companies in the subset	329	132	39
Average* turnover (million €, latest year)	2 779	731	729
Average* number of employees	9 162	1 897	3 455
Total R&D investment volume (million €)	30 384	2 197	1 676
Average* R&D investment volume (million €)	96	18	47
Average* number of R&D employees	534	100	237

* Averages per company that responded to the respective question. The averages are drawn up because relatively few companies concentrate a high volume while many others reported relatively little (only about one fourth of the companies lie above the average, the others below).

Source: European Commission DG JRC-IPTS

The 500 responses were then classified in the FTSE sector according to the standards described in Section 10.3: Sector Classification above. Table 2 reveals a high concentration of the responses among the sectors.

Table 2: Sources of responses to the questionnaire and distribution of sectors

FTSE description (2 digit)	EU		non EU subsidiaries	total responses
	independent	subsidiaries		
Aerospace & defence	0	0	1	1
Automobiles & parts*	15	5	1	21
Banks	1	0	0	1
Beverages	1	0	0	1
Chemicals*	84	47	12	143
Construction & buiding materials	2	3	0	5
Diversified industrials	1	1	0	2
Electricity	5	1	0	6
Electronic & electrical equipment*	16	2	1	19
Engineering & machinery*	51	31	11	93
Food producers & processors*	13	4	1	18
Forestry & paper	2	1	0	3
General retailers	0	0	0	0
Health*	17	4	1	22
Household goods & textiles	2	1	0	3
IT Hardware*	8	1	2	11
Leisure, entertainment & hotels	2	0	0	2
Media & photography	1	0	1	2
Mining	0	1	0	1
Oil & gas	4	1	0	5
Personal care & household	4	1	1	6
Pharmaceuticals & biotechnology*	60	15	6	81
Software & computer services	4	0	0	4
Speciality & other finance	1	0	0	1
Steel & other metals*	13	7	1	21
Support services*	16	4	0	20
Telecommunication services	2	1	0	3
Tobacco	0	1	0	1
Utilities - other	4	0	0	4
Subtotal (10 sectors *)	293	120	36	449
Total (29 sectors)	329	132	39	500

Source: European Commission DG JRC-IPTS

For ten sectors at least 10 responses have been received: automobiles & parts, chemicals, electronic & electrical equipment, engineering & machinery, food producers & processors, health, IT hardware, pharmaceuticals & biotech, steel & other metals and support services. The 449 companies in these ten sectors constitute 90% of the answers in the sample. Their main characteristics of these companies in the three subsets “EU independent company”, “EU subsidiary” and “non EU subsidiary” are shown in Table 3.

Table 3: Main characteristics of the 449 companies in the three subsets for the ten sectors

In ten sectors: automobiles & parts, chemicals, electronic & electrical equipment, engineering & machinery, food producers & processors, health, IT hardware, pharmaceuticals & biotech, steel & other metals and support services			
Indicator	EU		Non EU subsidiaries
	independent	subsidiaries	
Number of companies in the subset	293	120	36
Average* turnover (million €, latest year)	1 722	293	751
Average* number of employees	6 712	1 146	3 339
Total R&D investment volume (million €)	25 901	1 769	1 601
Average* R&D investment volume (million €)	93	15	50
Average* number of R&D employees	514	87	239

* Averages per company that responded to the respective question. The averages are drawn up because relatively few companies concentrate a high volume while many others reported relatively little (only about one fourth of the companies lie above the average, the others below).

Source: European Commission DG JRC-IPTS

Out of the 583 companies at the outset, the final sample analysed here focuses on the 449 companies in the ten sectors. These companies constitute 85% of R&D investment of the 500 companies admitted to the analysis. An overview of the filtering procedure is shown in Table 4.

Table 4: Filtering procedure

Filter criterion	Number
Total number of questionnaires received until deadline	583
Filtered by "is not investing in R&D nor planning to do so"	- 64
Filtered by "is not a company"	- 5
Filtered by "organisational unit"	- 5
Filtered by "is not a large non EU company"	- 3
Filtered by "is independent non EU company"	- 4
Filtered by "subsidiary is located outside the EU"	- 2
Filtered by "is not part of the ten sectors: automobiles & parts, chemicals, electronic & electrical equipment, engineering & machinery, food producers & processors, health, IT hardware, pharmaceuticals & biotech, steel & other metals and support services"	- 51
Total sample for analysis	449

Source: European Commission DG JRC-IPTS

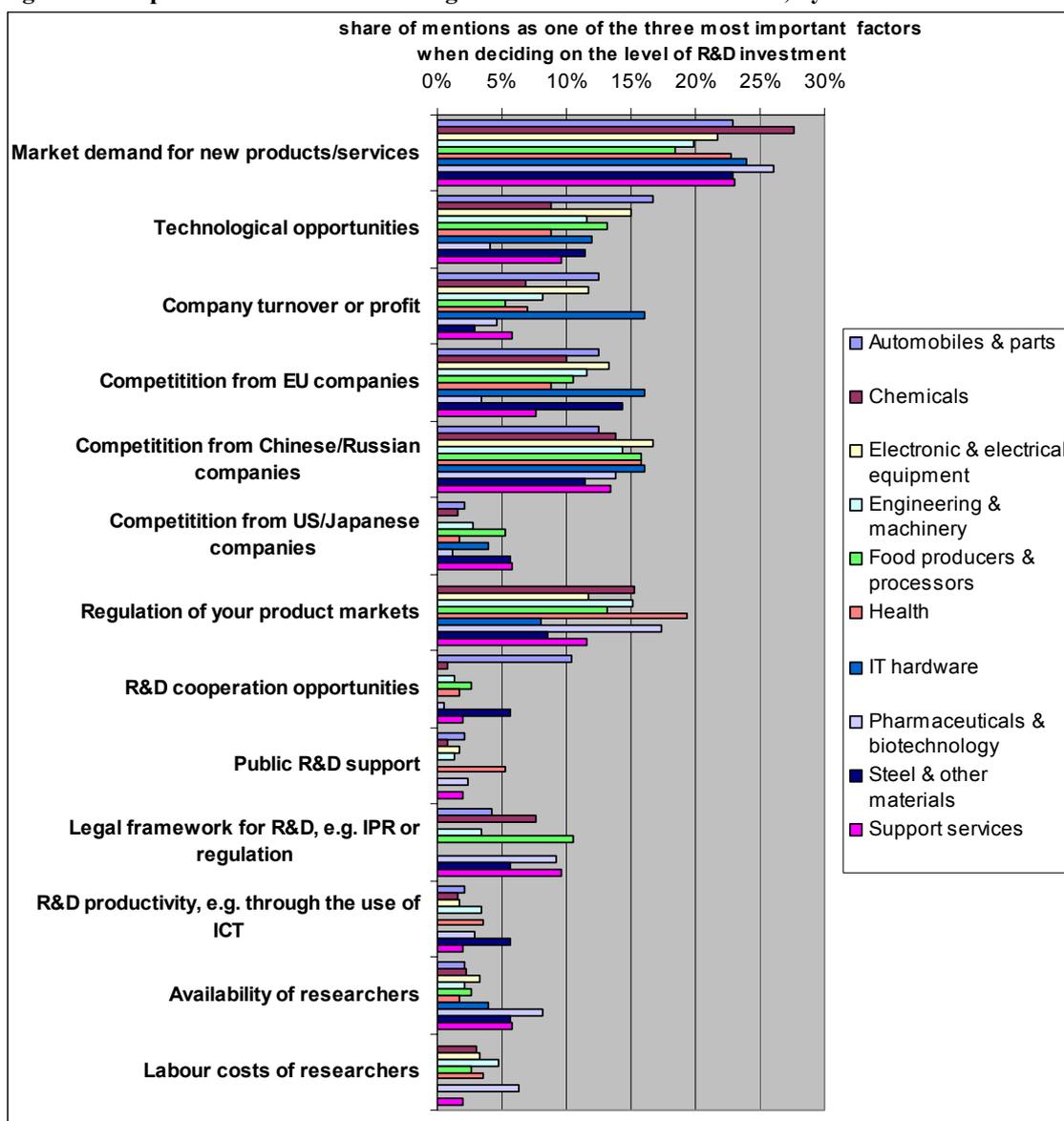
The results presented in this analysis are mainly drawn from the responses from independent EU companies. Additional results from responses of the EU subsidiary companies and non EU subsidiary companies are only presented where there are considerable differences to the results from the EU independent subset.

11 ANNEX B: FIGURES BY SECTOR

Instead of average scores, for each item the figures show the shares of respondents rating it as very or critically important. This puts a certain emphasis on those factors which are considered as really important and filter out average and below-average ratings. However, differences in the findings obtained by using “shares of respondents rating the item as very or critically important” or average scores are not really significant¹.

While the summarised figures for all sectors are highly influenced by the sectors with the biggest numbers of answers, i.e. chemicals, engineering & machinery and pharmaceuticals & biotechnology, the figures by sector shown here use the percentages based on the number of answers by sector. This allows detecting sectoral differences.

Figure 12: Importance of factors affecting the decision to invest in R&D, by sector

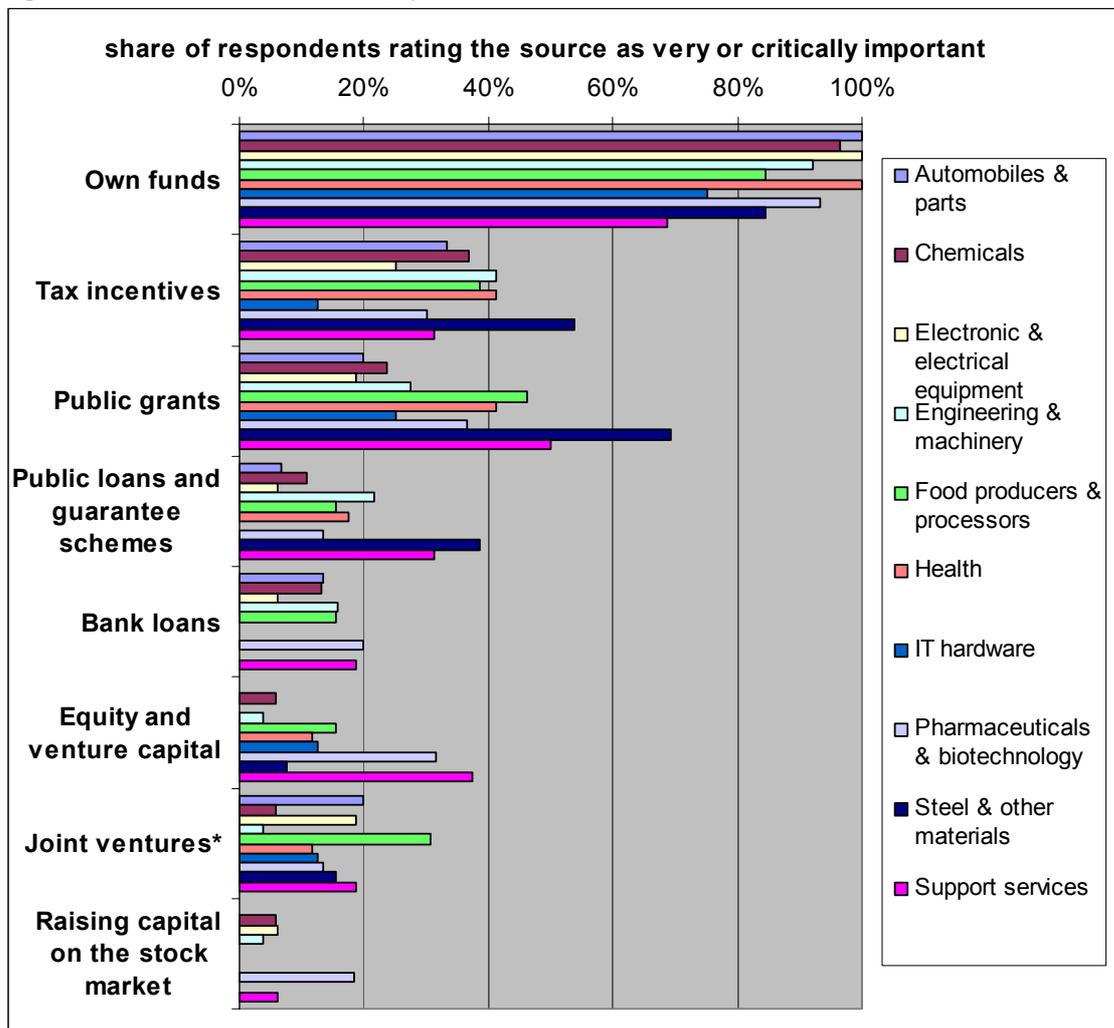


Note: Refers to 880 mentions for 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

¹ Differences appear at the lower order of the rankings, but never amongst the top three and very rarely among the top five items.

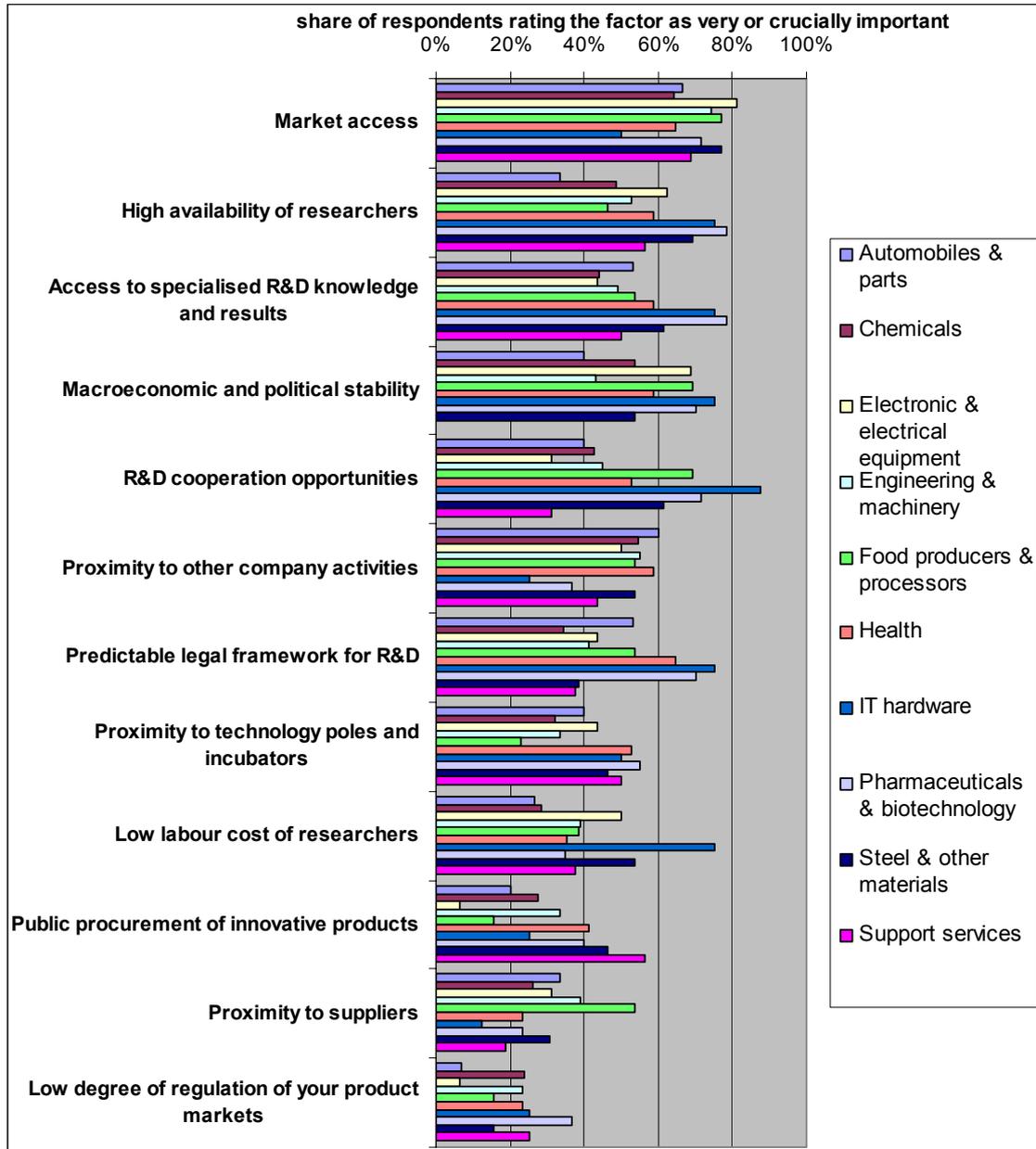
Figure 13: Sources of R&D funds, by sector



* “Joint Ventures” means a situation where funds for joint R&D projects are provided also by the project partners, so that the company does not finance this project fully on its own. The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

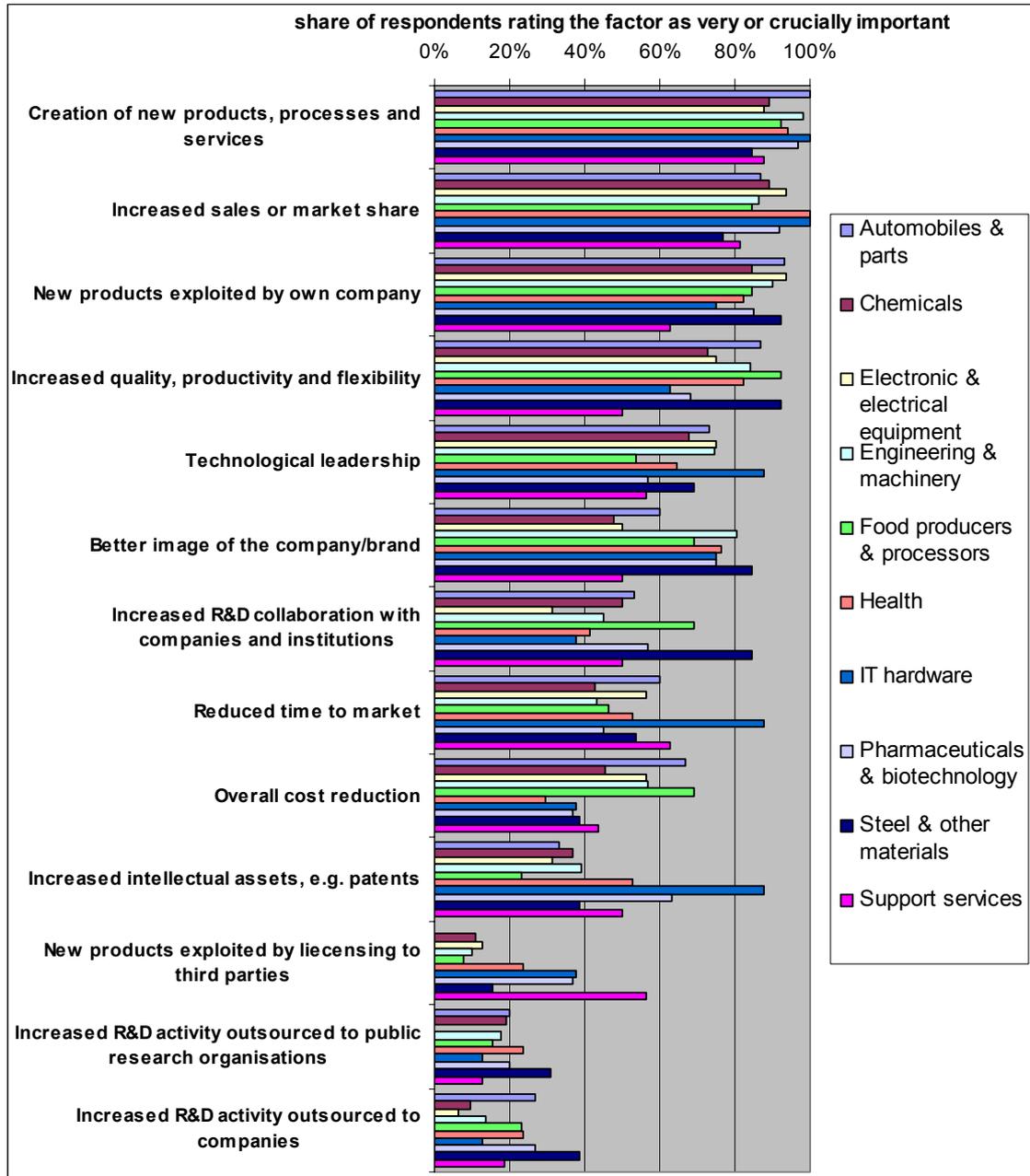
Figure 14: Importance of location factors, by sector



Note: The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample.

Source: European Commission DG JRC-IPTS

Figure 15: Expected outcomes of R&D investment, by sector



Note: The factors are sorted by average importance. Refers to 293 cases in the “EU independent company” sample: most favourable country = 3 points, 2nd = 2 points, 3rd = 1 point. Includes only countries mentioned at least five times.

Source: European Commission DG JRC-IPTS

12 ANNEX C: THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT INVESTMENT

A. Introduction

This survey is part of the European Union's 3 % research and technological development (R&D) investment action plan. "3 %" refers to the goal set by the European Council in Barcelona in 2002 for R&D investment to approach 3 % of EU GDP, two-thirds of which should be financed by the private sector. The survey collects information on **business trends in R&D investment**. Its results will be relevant both to firms and to policy-makers. Your contribution to this survey will help to shape **EU policies** in this field.

The information you provide will be treated as **confidential**. It will be used only within this study and will be aggregated for the analysis. No access will be granted to individual answers.

We estimate that it will take about **20 minutes** to complete the questionnaire.

We would appreciate if you could respond by **deadline**, preferably by using the **questionnaire on our website** at: <http://iri-survey.jrc.es/mainsample/questionnaire.htm>. Alternatively, you can send this completed form to the following address:

Institute for Prospective Technological Studies (IPTS)
Attn.: Alexander Tübke¹
Edificio Expo, Calle Inca Garcilaso s/n
Isla de la Cartuja
E-41092 Seville, Spain

We will send a priority copy of the results to your email.

Thank you very much for your assistance!

Company name: _____
Your company's sector of activity: _____
Town: _____
Country: _____
Your name: _____
Job title: _____
E-mail: _____

If your company belongs to a group, please state name and location of the parent company:

Definition of R&D investment

Research and Development (R&D) is creative work undertaken on a systematic basis to increase knowledge and to apply it - for example, to create new processes, products and services. R&D can be carried out inhouse or outsourced to third parties. For the purposes of this questionnaire, 'R&D investment' is the amount your company reports as R&D in its most recent accounts.

¹ Fax : +34 95 448 83 26; Tel : +34 95 448 83 80

B. Corporate background

1. How many employees are currently working in your company?

About _____ employees

2. What were the total net sales (turnover) of your company in the last financial year?

About € _____ million

C. R&D investment levels and trends

3. Is your company investing in R&D?

Yes, it is investing in R&D

inhouse and/or

outsourced.

No, it is not investing in R&D but planning to do so in the future

inhouse and/or

outsourced.

No, it is not investing in R&D nor planning to do so in the future. In this case please go directly to question 12 on the last page of this questionnaire.

4. Please estimate how much of your company's R&D activity is carried out inhouse and how much is outsourced?

_____ % inhouse

+ _____ % outsourced to companies

+ _____ % outsourced to public research organisations

= 100 %

5. How many employees are currently working full time or part time on R&D in your company?

About _____ employees

6. How much did your company invest in R&D in the last financial year?

About € _____ million

7. By how much do you expect your company's R&D investment to change?

a) by _____ % for the next year

b) by _____ % per annum over the next three years

8. a) Which of the following factors currently influence your company to invest more, the same or less in R&D?

Changes in:	Invest less	Invest the same	Invest more
(a) Market demand for new products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Competition from companies located in:			
(b1) the European Union	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b2) other industrialised countries, e.g. the US or Japan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b3) emerging countries, e.g. China or Russia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Technological opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) R&D productivity, e.g. through the use of IT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) The company's turnover or profit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Availability of researchers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Labour costs of researchers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h) Regulation of your product markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(i) Legal framework for R&D, e.g. Intellectual Property Rights or R&D regulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(j) R&D cooperation opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(k) Public R&D support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(l) Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- b) Which of the above factors are the most important ones when your company decides on how much to invest in R&D? *Please indicate three.*

1. _____ 2. _____ 3. _____

9. How important are the following sources of funds for financing your company's R&D investment? *Please rate on a scale from 1 (unimportant) to 5 (critically important).*

	Un-important					Critically important
	1	2	3	4	5	
(a) Your company's own funds	<input type="checkbox"/>					
(b) Joint Ventures	<input type="checkbox"/>					
(c) Bank loans	<input type="checkbox"/>					
(d) Equity and venture capital	<input type="checkbox"/>					
(e) Raising capital on the stock market	<input type="checkbox"/>					
(f) Public grants	<input type="checkbox"/>					
(g) Tax incentives	<input type="checkbox"/>					
(h) Public loans and guarantee schemes	<input type="checkbox"/>					
(i) Other: _____	<input type="checkbox"/>					

D. R&D location strategy and management

10. a) If you had to locate or increase some of your company's R&D investment in another country than your home country, what importance would the following factors have for your choice? *Please rate on a scale from 1 (unimportant) to 5 (critically important).*

	Un-important					Critically important
	1	2	3	4	5	
(a) Market access	<input type="checkbox"/>					
(b) Public procurement of innovative products	<input type="checkbox"/>					
(c) Proximity to other company activities (e.g. production or sales)	<input type="checkbox"/>					
(d) Proximity to suppliers	<input type="checkbox"/>					
(e) Proximity to technology poles ² and incubators	<input type="checkbox"/>					
(f) Access to specialised R&D knowledge and results	<input type="checkbox"/>					
(g) High availability of researchers	<input type="checkbox"/>					
(h) Low labour costs of researchers	<input type="checkbox"/>					
(i) R&D cooperation opportunities	<input type="checkbox"/>					
(j) Predictable legal framework for R&D, e.g. Intellectual Property Rights	<input type="checkbox"/>					
(k) Low degree of regulation of your product markets	<input type="checkbox"/>					
(l) Macroeconomic and political stability	<input type="checkbox"/>					
(m) Other: _____	<input type="checkbox"/>					

b) Which Member States of the European Union (under the possible inclusion of your home country) are currently the most attractive for locating your company's R&D? *Please rank by attractiveness.*

1. _____ 2. _____ 3. _____

c) Which other (non-EU) countries are currently the most attractive for locating your company's R&D? *Please rank by attractiveness.*

1. _____ 2. _____ 3. _____

² "Technology Poles" are areas where R&D active companies, institutions and Universities are concentrated.

d) Over the next three years, at which of your company's present or future locations will your R&D investment strategy lead to changes in the number of personnel and/or the level of activity?

	Decrease	Not change	Increase
Trends in R&D personnel in the following countries (including your home country):			
(country 1) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(country 2) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(country 3) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trends in R&D personnel in the following countries (including your home country):			
(country 1) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(country 2) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(country 3) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E. Outcomes of R&D investment strategy

11. What are your expectations for the following outcomes of your company's R&D investment strategy? Please rate on a scale from 1 (no expectation) to 5 (significant expectation).

	No expectation 1	2	3	4	Significant expectation 5
(a) Creation of new products, processes and services	<input type="checkbox"/>				
(b) Increased sales or market share	<input type="checkbox"/>				
(c) Increased intellectual assets, e.g. patents	<input type="checkbox"/>				
(d) Technological leadership	<input type="checkbox"/>				
(e) Increased quality, productivity and flexibility	<input type="checkbox"/>				
(f) Better image of the company/brand	<input type="checkbox"/>				
(g) Overall cost reduction	<input type="checkbox"/>				
(h) Reduced time to market	<input type="checkbox"/>				
(i) R&D activity increasingly carried out:					
(i1) in collaboration with companies and institutions	<input type="checkbox"/>				
(i2) outsourced to companies	<input type="checkbox"/>				
(i3) outsourced to public research organisations	<input type="checkbox"/>				
(j) New products increasingly exploited by:					
(j1) your company	<input type="checkbox"/>				
(j2) licensing to third parties	<input type="checkbox"/>				
(k) Other: _____	<input type="checkbox"/>				

12. If you don't invest in R&D nor plan to do so in the future, how determinant are the following factors for this decision? *Please rate on a scale from 1 (not determinant) to 5 (highly determinant).*

	Not determinant 1	2	3	4	Highly determinant 5
(a) Irrelevance of R&D to your product line	<input type="checkbox"/>				
(b) R&D results are acquired from third parties	<input type="checkbox"/>				
(c) Lack of market demand for new products/services	<input type="checkbox"/>				
(d) Limited technological opportunities	<input type="checkbox"/>				
(e) Lack of regulation of your product markets	<input type="checkbox"/>				
(f) Limited availability of researchers	<input type="checkbox"/>				
(g) High labour costs of researchers	<input type="checkbox"/>				
(h) Inadequate legal framework for R&D, e.g. Intellectual Property Rights or R&D regulation	<input type="checkbox"/>				
(i) Lack of R&D cooperation opportunities	<input type="checkbox"/>				
(j) Lack of access to specialised R&D knowledge and results	<input type="checkbox"/>				
(k) Lack of access to financial resources for R&D	<input type="checkbox"/>				
(l) Lack of access to public R&D support	<input type="checkbox"/>				
(m) Other: _____	<input type="checkbox"/>				

F. Suggestions

13. Any further suggestions or comments regarding European actions³ to raise R&D investment you would like to add:

Note: We would highly appreciate any additional information, particularly in the form of company reports or other publications, regarding your company's R&D investment strategy.

Thank you very much for your contribution!

³ See also the Industrial Research and Innovation website at: http://www.jrc.es/home/pages/action_4132.htm.