



## Appendices

## APPENDIX I - BMW Region Industry Structure, 2002

### Number of Business Firms by County within the BMW Region, 2002

Number of Business Firms by County and by Size*								
Ref	County	1-10	11-99	100-249	250-499	500+	Total	%
B1	Donegal	194	131	18	1	2	346	10.7
B2	Leitrim	50	26	2	1	0	79	2.4
B3	Sligo	98	69	6	1	2	176	5.4
B4	Cavan	103	73	8	4	1	189	5.8
B5	Monaghan	88	80	17	1	1	187	5.8
B6	Louth	238	177	10	9	2	436	13.4
W1	Mayo	155	112	7	3	2	279	8.6
W2	Galway	459	317	41	7	5	829	25.5
W3	Roscommon	57	45	2	1	1	106	3.3
M1	Longford	36	41	7	1	0	85	2.6
M2	Westmeath	137	75	15	3	2	232	7.1
M3	Offaly	95	63	8	1	1	168	5.2
M4	Laois	76	56	3	0	1	136	4.2
	<b>Total</b>	<b>1786</b>	<b>1265</b>	<b>144</b>	<b>33</b>	<b>20</b>	<b>3248</b>	<b>100</b>
	<b>%</b>	<b>55.0</b>	<b>38.9</b>	<b>4.4</b>	<b>1.0</b>	<b>0.6</b>		<b>100</b>

Source: Kompass, 2003

Note: \*This list excludes Local Authorities, Health Boards, Hospitals, Chambers of Commerce, State Agencies

### Number of Food Business Firms by County and by Size within the BMW Region, 2002

Ref	County	1-10	11-99	100-249	250-499	500+	Total	%	Total Industry
B1	Donegal	7	21	7	0	0	35	15.8	10.7
B2	Leitrim	4	1	0	0	0	5	2.3	2.4
B3	Sligo	3	3	1	0	1	8	3.6	5.4
B4	Cavan	8	8	3	1	0	20	9.0	5.8
B5	Monaghan	2	10	7	0	1	20	9.0	5.8
B6	Louth	7	10	1	2	2	22	10.0	13.4
W1	Mayo	5	15	3	1	0	24	10.9	8.6
W2	Galway	9	20	3	1	0	33	14.9	25.5
W3	Roscommon	4	10	2	0	1	17	7.7	3.3
M1	Longford	0	5	2	1	0	8	3.6	2.6
M2	Westmeath	2	3	2	0	0	7	3.2	7.1
M3	Offaly	3	10	3	0	0	16	7.2	5.2
M4	Laois	2	3	1	0	0	6	2.7	4.2
	<b>Total</b>	<b>56</b>	<b>119</b>	<b>35</b>	<b>6</b>	<b>5</b>	<b>221</b>		<b>100.0</b>
	<b>%</b>	<b>25.3</b>	<b>53.8</b>	<b>15.8</b>	<b>2.7</b>	<b>2.3</b>	<b>100</b>	<b>100.0</b>	

Source: Kompass, 2003

Four counties, Donegal, Cavan, Monaghan and Roscommon have a higher than average number of food firms.

## Comparison of Sectoral Employment Nationally with the BMW Region, 2002

Employment by Sector (2002)	All Regions - National			BMW		
	Total	MNEs	Irish	Total	MNEs	Irish
Food products beverages and tobacco	48,158	13,096	35,062	13332	2293	11039
Textiles and textile products	5,007	2,023	2,984	2078	771	1307
Clothing, footwear and leather	4,025	563	3,462	1303	204	1099
Wood and wood products	6,235	632	5,603	2575	323	2252
Pulp paper and paper products; publishing and printing	13,298	1,530	11,768	1809	264	1545
Chemicals chemical products and man-made fibres	23,550	19,568	3,982	4375	3326	1049
Rubber and plastic products	9,746	4,322	5,424	3399	1824	1575
Other non-metallic mineral products	11,638	1,798	9,840	3692	176	3516
Basic and fabricated metal products	17,508	4,742	12,766	5163	1508	3655
Machinery and equipment n.e.c.	12,277	5,479	6,798	3477	1264	2213
Electrical and optical equipment	55,631	46,147	9,484	15707	13206	2501
Transport equipment	11,106	9,076	2,030	2432	1708	724
Other manufacturing n.e.c.	9,487	1,098	8,389	3043	253	2790
<b>Total Manufacturing</b>	<b>227,666</b>	<b>110,074</b>	<b>117,592</b>	<b>62385</b>	<b>27120</b>	<b>35265</b>
Financial Services	10,892	7,578	3,314	184	169	15
International Services	56,467	34,560	21,907	5797	3216	2581
Other	8,682	1,146	7,536	3274	133	3141
<b>Total</b>	<b>303,707</b>	<b>153,358</b>	<b>150,349</b>	<b>71640</b>	<b>30638</b>	<b>41002</b>
<b>Percentage</b>	<b>100%</b>	<b>50.4%</b>	<b>49.5%</b>	<b>100%</b>	<b>42.8%</b>	<b>57.2%</b>

Source: Forfas Database, 2003

## BMW Employment by Sector as a % of National Employment, 2002

	Total	MNEs	Irish
Food products beverages and tobacco	27.7	17.5	31.5
Textiles and textile products	41.5	38.1	43.8
Clothing, footwear and leather	32.4	36.2	31.7
Wood and wood products	41.3	51.1	40.2
Pulp paper and paper products; publishing and printing	13.6	17.3	13.1
Chemicals chemical products and man-made fibres	18.6	17.0	26.3
Rubber and plastic products	34.9	42.2	29.0
Other non-metallic mineral products	31.7	9.8	35.7
Basic and fabricated metal products	29.5	31.8	28.6
Machinery and equipment n.e.c.	28.3	23.1	32.6
Electrical and optical equipment	28.2	28.6	26.4
Transport equipment	21.9	18.8	35.7
Other manufacturing n.e.c.	32.1	23.0	33.3
<b>Total Manufacturing</b>	<b>27.4</b>	<b>24.6</b>	<b>30.0</b>
Financial Services	1.7	2.2	.5
International Services	10.3	9.3	11.8
Other	37.7	11.6	41.7
<b>Total</b>	<b>23.6</b>	<b>20.0</b>	<b>27.3</b>

Source: Forfas Database, 2003

**BMW Employment by Industrial Sector in the Border, Midlands & Western Region, 2002**

<b>Industrial Sectors</b>	<b>Border</b>		
	<b>Total</b>	<b>MNEs</b>	<b>Irish</b>
<i>Food products beverages and tobacco</i>	7,454	1,206	6,248
<i>Textiles and textile products</i>	1,557	771	786
<i>Clothing, footwear and leather</i>	929	133	796
<i>Wood and wood products</i>	1,047	288	759
<i>Pulp paper and paper products; publishing and printing</i>	670	37	633
<i>Chemicals chemical products and man-made fibres</i>	2,094	1,580	514
<i>Rubber and plastic products</i>	1,590	826	764
<i>Other non-metallic mineral products</i>	1,890	13	1,877
<i>Basic and fabricated metal products</i>	2,001	543	1,458
<i>Machinery and equipment n.e.c.</i>	1,353	93	1,260
<i>Electrical and optical equipment</i>	4,563	3,664	899
<i>Transport equipment</i>	1,239	973	266
<i>Other manufacturing n.e.c.</i>	1,501	3	1,498
<b>Total Manufacturing</b>	<b>27,888</b>	<b>10,130</b>	<b>17,758</b>
<i>Financial Services</i>			
<i>International Services</i>	2,119	1,276	843
<i>Other</i>	1,429	117	1,312
<b>Total</b>	<b>31436</b>	<b>11523</b>	<b>19913</b>

<b>Industrial Sectors</b>	<b>Midlands</b>		
	<b>Total</b>	<b>MNEs</b>	<b>Irish</b>
<i>Food products beverages and tobacco</i>	2,151	318	1,833
<i>Textiles and textile products</i>	119		119
<i>Clothing, footwear and leather</i>	109	47	62
<i>Wood and wood products</i>	659	35	624
<i>Pulp paper and paper products; publishing and printing</i>	322	35	287
<i>Chemicals chemical products and man-made fibres</i>	205	43	162
<i>Rubber and plastic products</i>	1,156	586	570
<i>Other non-metallic mineral products</i>	857	160	697
<i>Basic and fabricated metal products</i>	1,315	183	1,132
<i>Machinery and equipment n.e.c.</i>	572	368	204
<i>Electrical and optical equipment</i>	2,384	2,212	172
<i>Transport equipment</i>	962	667	295
<i>Other manufacturing n.e.c.</i>	526	44	482
<b>Total Manufacturing</b>	<b>11,337</b>	<b>4,698</b>	<b>6,639</b>
<i>Financial Services</i>			
<i>International Services</i>	907	691	216
<i>Other</i>	366		366
<b>Total</b>	<b>12,610</b>	<b>5,389</b>	<b>7,221</b>

Industrial Sectors	West		
	Total	MNEs	Irish
Food products beverages and tobacco	3,727	769	2,958
Textiles and textile products	402		402
Clothing, footwear and leather	265	24	241
Wood and wood products	869		869
Pulp paper and paper products; publishing and printing	817	192	625
Chemicals chemical products and man-made fibres	2,076	1,703	373
Rubber and plastic products	653	412	241
Other non-metallic mineral products	945	3	942
Basic and fabricated metal products	1,847	782	1,065
Machinery and equipment n.e.c.	1,552	803	749
Electrical and optical equipment	8,760	7,330	1,430
Transport equipment	231	68	163
Other manufacturing n.e.c.	1,016	206	810
<b>Total Manufacturing</b>	<b>23,160</b>	<b>12,292</b>	<b>10,868</b>
Financial Services	184	169	15
International Services	2,771	1,249	1,522
Other	1,479	16	1,463
<b>Total</b>	<b>27,594</b>	<b>13,726</b>	<b>13,868</b>

Source: Forfas Database, 2003

Industrial Sectors	Border			Midlands			West		
	Total	MNEs	Irish	Total	MNEs	Irish	Total	MNEs	Irish
Food products beverages and tobacco	175	10	165	50	4	46	99	8	91
Textiles and textile products	56	3	53	7		7	25		25
Clothing, footwear and leather	38	2	36	11	1	10	20	3	17
Wood and wood products	61	2	59	32	1	31	45		45
Pulp paper and paper products; publishing and printing	42	1	41	22	2	20	40	3	37
Chemicals chemical products and man-made fibres	34	10	24	9	3	6	21	8	13
Rubber and plastic products	40	14	26	20	6	14	23	7	16
Other non-metallic mineral products	76	1	75	31	4	27	61	1	60
Basic and fabricated metal products	112	8	104	61	4	57	79	11	68
Machinery and equipment n.e.c.	48	4	44	24	7	17	40	5	35
Electrical and optical equipment	66	24	42	23	14	9	87	35	52
Transport equipment	27	8	19	13	2	11	18	2	16
Other manufacturing n.e.c.	134	2	132	35	2	33	97	3	94
<b>Total Manufacturing</b>	<b>909</b>	<b>89</b>	<b>820</b>	<b>338</b>	<b>50</b>	<b>288</b>	<b>655</b>	<b>86</b>	<b>569</b>
Financial Services							6	3	3
International Services	100	9	91	31	4	27	158	23	135
Other	158	4	154	15		15	273	2	271
<b>Total</b>	<b>1,167</b>	<b>102</b>	<b>1,065</b>	<b>384</b>	<b>54</b>	<b>330</b>	<b>1,092</b>	<b>114</b>	<b>978</b>

Source: Forfas Database, 2003

## APPENDIX 2 – BMW Region Innovation Audit Questionnaire



# INNOVATION IN YOUR COMPANY

STRICTLY CONFIDENTIAL - THE RESPONSES OF INDIVIDUAL RESPONDENTS WILL NOT BE DISCLOSED TO ANY PARTIES APART FROM OUR CONSULTANTS WHO ARE BOUND BY THE INTERNATIONAL CODES OF CONFIDENTIALITY OF INFORMATION

### 1. Respondent details (Block Capitals please)

Company Name:	County:
Respondent:	Title:
Email Address:	Tel. No:

### 2. What INNOVATION ACTIVITIES have you undertaken in the last 3 years?

<i>Tick any innovation activities your company undertook</i>	<i>Tick ✓</i>	
R&D for product or process development in your own company	—	
R&D for product or process development carried out on your behalf outside the company	—	
Product design	—	
Acquisition of licences, franchises, patents or other technology transfer	—	
Licensing out – technology, information, etc.	—	
Acquisition of machinery, equipment, software used for innovation activities	—	
Acquisition of company/companies	—	
Training for innovation activities	—	
Recruitment of innovation staff – R&D, technology transfer, information, etc.	—	
New market entry or market introduction of new products or new services	—	
Significantly changed organisation structure	—	
Any others? (Please specify)	•	—
	•	—

**3. What are the 3 most important sources of INFORMATION do you use when developing innovative activities?**

	<i>Write in block capitals, please</i>
• Most Important	
• Second most important	
• Third most important	
<p><b>Typical Sources of Information include:</b>            Own staff; Clients/customers; Suppliers (of materials, equipment, components, software); Competitors; Other enterprises in your industry; Trade fairs/exhibitions; Meetings/conferences; Trade press/industry studies/internet; Commercial research bodies; Higher education institutes; State development agencies; Trade &amp; professional associations; Networking &amp; joint ventures;  <b>(If other, please specify).</b></p>	

**4. What are the 3 main ENABLERS or STIMULATORS assisting innovation in your company?**

	<i>Write in block capitals, please</i>
• Most Important	
• Second most important	
• Third most important	
<p><b>Typical Enablers or Stimulators include:</b>            Finance; State grants/loans; Graduates or technicians from local colleges; Training for staff; Supports for training; External R&amp;D services; State advisory services; Partnerships/linkages; Networking with other companies; Private sector consultants; Relevant courses in local colleges;  <b>(If other, please specify).</b></p>	

**5. What are the 3 main INHIBITORS or BARRIERS reducing or preventing innovation in your company?**

	<i>Write in block capitals, please</i>
• Most Important	
• Second most important	
• Third most important	
<p><b>Typical Inhibitors/Barriers include:</b></p> <p>Funding; Risk of innovation; Shortage of skilled staff &amp; managers; Difficulties in attracting R&amp;D / technical staff; Lack of information on State supports; Difficulties in accessing State support; Planning &amp; licences; Lack of information on new products, markets or technologies; Inadequate infrastructure: Telecommunications generally, broadband, electricity or other power, water, rail, road, airports, ports; <b>(If other, please specify).</b></p>	

**6. What 3 DRIVERS ‘pushed’ your innovation activities over the last 3 years?**

	<i>Write in block capitals, please</i>
• Most Important	
• Second most important	
• Third most important	
<p><b>Typical Drivers include:</b></p> <p>Own R&amp;D; External R&amp;D for you by third parties; Existing staff; New staff; Demands from customers; Competition; Suppliers; Developments in the industry; Market research; External industry information and events (trade fairs, conferences, etc.); Licensing / other technology transfer; The third level sector; The development agencies; Business networks or partnerships; Trade or professional associations; <b>(If other, please specify).</b></p>	

**7. Have you participated in Networks, Cross Border or EU R&D Programmes?**

<b>Have you.....</b>	Yes	No			
• Received funds from EU 4th or 5th Framework Programme (1994-02)					
• Participated in Cross Border innovation co-operation / initiatives <i>Please name:</i>					
• Participated in partnerships or joint ventures					
• Participated in networks					
If yes, to <b>networks</b> , please indicate the purpose(s): (Please tick)	<b>R&amp;D</b>	<b>Marketing</b>	<b>Training</b>	<b>Purchasing</b>	<b>General Business</b>
	—	—	—	—	—

**8. Can you provide estimates of the RESULTS and IMPACTS of your innovative activities over the last 3 years in so far as possible?**

<b>New Products or Services</b>	<b>Number</b>	<b>Patents</b>	<b>Number</b>
How many New Products/Services were <b>developed</b> in the last 3 years?		How many patent applications were <b>made</b> in the last 3 years?	
How many New Products/Services were <b>commercialised</b> in the last 3 years?		How many full patents were granted in the last 3 years?	

<b>Employment Impacts in the last 3 years</b>	<b>Number Full Time</b>	<b>Number Part Time</b>
Number of jobs increased by your innovation activities:		
Number of jobs under threat saved by your innovation activities:		

**Estimated 3 Year value of innovative activities on:**

<b>Increased profitability</b>	_____ %
<b>Increased turnover</b>	
• In the Irish market	_____ %
• In export markets	_____ %
<b>Reduced production costs</b>	_____ %

*\*Ignore the effect of the current trading conditions on your company, i.e., treat your turnover as static and estimate the impacts of innovation on your profit, turnover, etc*

**Have you entered any new export markets in the last 3 years?      Yes \_      No \_**

If yes, what countries? \_\_\_\_\_

**9. INNOVATION PROGRAMME SUPPORTS - Have you, within the past 3 years received any form of support for innovation from any of the following?**

**9.1 Public sector development agencies (Please tick)**

AGENCY	Feasibility Studies	RTI	Higher Education – industry R&D grants	Innovation Management	Information	R&D Capability grants
Enterprise Ireland	—	—	—	—	—	—
Údarás na Gaeltachta	—	—	—	—	—	—
County Enterprise Board	—	—	—	—	—	—
Other (specify)	—	—	—	—	—	—
	—	—	—	—	—	—

**9.2 What are the three most useful industry associations of which you are a member?**

*Write in block capitals, please*

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Examples:** Trade Association, Chambers of Commerce, Prof. Assoc, IBEC, SFA, ISME, Other (please specify)

**9.3 Have you used any of the services available through universities or Institutes of Technology in the past 3 years? Yes \_ No \_**

If yes, name the main 4 you used and what services did you use during the past 3 years?  
(Please insert name and tick service(s))

Insert the Name of Higher Education institution	R&D	Consult -ancy	Recruited Staff	Training/ Education
1. _____				
2. _____	—	—	—	—
3. _____	—	—	—	—
4. _____	—	—	—	—

## 10. Can you **ESTIMATE** your % **SPENT** on innovation in the past 3 years?

### Innovation Activities

• R&D/new product development/process development	<input type="text"/>	%
• Technology Transfer	<input type="text"/>	%
• New market entry or market introduction of new products or new services	<input type="text"/>	%
• New organization costs	<input type="text"/>	%
• Other related innovation costs e.g. staff training, recruitment, information	<input type="text"/>	%
<b>TOTAL Estimated % of 3 Years Turnover</b>	<input type="text"/>	%

## 11. Please provide the following **COMPANY DETAILS**:

Please tick

Ownership	
Irish	<input type="checkbox"/>
UK	<input type="checkbox"/>
Other EU	<input type="checkbox"/>
USA	<input type="checkbox"/>
Other	<input type="checkbox"/>

Turnover - €M	
Less than €0.5M	<input type="checkbox"/>
€0.51 - €1m	<input type="checkbox"/>
€1.1M - €5M	<input type="checkbox"/>
€5.1M - €10M	<input type="checkbox"/>
€11M - €25M	<input type="checkbox"/>
€26M - €50M	<input type="checkbox"/>
€50M +	<input type="checkbox"/>

Employment	
1-10	<input type="checkbox"/>
11-25	<input type="checkbox"/>
26-50	<input type="checkbox"/>
51-100	<input type="checkbox"/>
101-250	<input type="checkbox"/>
251-500	<input type="checkbox"/>
500 +	<input type="checkbox"/>

Graduate/Technical/Craft Employment	Number	% of your workforce
How many graduates/technicians/craftspeople do you employ?	<input type="text"/>	<input type="text"/> %

Number in R&D	% of your workforce
<input type="text"/>	<input type="text"/> %

**Principal Activity of Your Company** *(Please tick)*

Agriculture/Forestry/Fishing	—
Food/Drink/Tobacco	—
Textiles/Clothing/Footwear	—
Paper/Printing/Publishing	—
Chemical/Pharmaceutical	—
Medical Devices	—
Metals/Engineering	—
Electronics Manufacturing	—
Non-metallic Mineral Products	—
Rubber & Plastics	—
Timber & Construction Products	—
Other Manufacturing	—
Retail/Wholesale	—
Software Development & Services	—
Electricity/Gas/Oil/Fuel	—
Hotel/Catering/Leisure/Tourism	—
Financial Services	—
Other Services <i>(Please specify)</i>	—

**THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.**

You are helping the development of the Border, Midland and Western Region. If you wish to make any further comments or suggestions, please add another page.

*Return address:* \_\_\_\_\_

**The CIRCA Group, 26 Upper Pembroke Street, Dublin 2. Fax: 01 – 637 3986**

## Appendix 3 – European Innovation Scoreboard Definitions

### Human Resources

1.	Human Resources	Basis	Interpretation
1.1	Supply of new scientists and engineers	No. and % of total population (20-29 yrs) in the region	The indicator is a measure of the supply of new graduates with training in S&E.
1.2	Population with tertiary education	No. and % of total population in the region	This is a general indicator of the supply of advanced skills
1.3	Participation in Life Long Learning	No. and % of total population in the region	A central characteristic of a knowledge economy is continual technical development, learning and innovation.
1.4	Employment in medium-high & hi-tech manufacturing	No. and % of total labour pool in the region	The percentage of total employment in medium-high and high-tech manufacturing sectors is an indicator of the fraction of economic activity in manufacturing sectors characterised by high levels of innovative activity.
1.5	Employment in hi-tech services	No. and % of total labour pool in the region	The high-technology services provide services directly to consumers, and provide inputs to the innovative activities of other firms.

### 1.1 Supply of New Scientists & Engineers

**Definition:** S&E graduates are defined as all post-secondary education graduates (ISCED classes 5a and above) in life sciences (ISC42), physical sciences (ISC44), mathematics and statistics (ISC46), computing (ISC48), engineering and engineering trades (ISC52), manufacturing and processing (ISC54) and architecture and building (ISC58).

**Disadvantages and advantages:** Due to problems of comparability across countries, this indicator uses broad educational categories. This means that it covers everything from graduates of one-year diploma programmes to PhDs. Some of the graduates will be younger or older than the population of 20-29 year olds and migration will distort the figures.

### 1.2 Population with a Tertiary Education

**Definition:** The percentage of the total working age population (25-64 years age class) with some form of post-secondary education (ISCED 5 and 6).

**Disadvantages and advantages:** International comparisons of educational levels are notoriously difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. Therefore, the results should be interpreted cautiously.

### I.3 Participation in Lifelong Learning

**Definition:** The reference population is all age classes between 25 and 64 years inclusive. Lifelong learning is defined as participation in any type of education or training course during the four weeks prior to the survey. It includes initial education, further education, continuing or further training, training within the company apprenticeship, on-the-job training, seminars, distance learning, and evening classes.

**Disadvantages and advantages:** The limitation of the indicator to a brief window of four weeks in the Spring could reduce comparability between countries due to differences in adult education systems.

### I.4 Employment in Medium Tech and High Tech manufacturing

**Definition:** The medium-high and high-technology sectors include chemicals (NACE 24), machinery (NACE 29) office equipment (NACE 30), electrical equipment (NACE 31), telecom equipment (NACE 32), precision instruments (NACE 33), automobiles (NACE34), and aerospace and other transport (NACE 35). The total workforce includes all manufacturing and service sectors. This indicator is equivalent to the indicator used to benchmark national R&D policies.

**Disadvantages and advantages:** The use of total employment gives a better indicator than using the share of manufacturing employment alone, since the latter will be affected by the hollowing out of manufacturing in some countries.

### I.5 Employment in high tech services

**Definition:** This indicator focuses on three leading edge sectors that produce high-technology services: post and telecommunications (NACE 64); information technology including software development (NACE 72); and R&D services (NACE 73). The total workforce includes all manufacturing and service sectors.

**Disadvantages and advantages:** The results depend on the importance of IT in manufacturing and to the degree of out-sourcing of R&D. The former partly explains the comparatively high shares for the Scandinavian countries.

## Knowledge Creation

2.	Knowledge Creation	Basis	Interpretation
2.1	Public R&D expenditure including HE expenditure	Public R&D expenditure as a percentage of GDP in the region	Basic and applied knowledge in HE universities and institutions, plus trained research staff and new instrumentation and prototypes.
2.2	Business R&D expenditure	Business R&D expenditure as a percentage of GDP in the region	The indicator captures the formal creation of new technical knowledge by firms.
2.3a	High-tech patents at the European Patent Office (EPO)	Nos. applicable to the region	The most notable aspect of the EPO patent trends is that high-tech patenting has increased in all countries
2.3b	High-tech patents at the United States Patent Office (USPTO)	Nos. applicable to the region	The indicator is the number of patent applications at the US Patent and Federal Mark Office (USPTO) in high-technology patent classes, per million population.

### 2.1 Public R&D Expenditure

**Definition:** The indicator measures public R&D expenditures (from all sources of funding) by government organisations (GOVERD) and higher education institutions (HERD). The “structural indicators” do not offer an indicator on public R&D expenditure. However, subtracting structural indicator 2.2.2 (total R&D expenditures) and 2.2.1 (business R&D expenditures) produces a figure that is very similar to this indicator. The only difference is due to “private non-profit” R&D expenditures, which account for less than 1% of all R&D spending in most EU countries.

**Advantages and disadvantages:** The main disadvantage is that not all of public R&D is relevant to technical innovation, at least in the short and medium term.

### 2.2 Business expenditure on R&D

**Definition:** This indicator measures the R&D expenditure (from all sources of funding) of the business sector (manufacturing and services) as a percentage of GDP. The indicator is equivalent to the Commission’s structural indicator 2.2.1 but different to the indicator used for benchmarking national research policies. The latter measures R&D financed by industry.

**Advantages and disadvantages:** First, R&D is a poor measure of the innovative activities of small firms and in those industries where important sources of innovation are outside the R&D laboratory, e.g. in production engineering departments and design offices. Second, differences in aggregate R&D intensity across countries is partly due to differences in the structural mix of industries within each country.

## 2.3(a) High-tech patent applications

### a) EPO Patent Application

**Definition:** The indicator is the number of 1999 patent applications at the EPO in high-technology patent classes, per million of population. The high-technology patent classes include pharmaceutical biotechnology, information technology and aerospace.

**Advantages and disadvantages:** The present indicator is limited to rapidly growing patent classes where innovation is science-driven and where a high percentage of all innovations are probably patented. This limitation acts to both measure inventive activity in the most promising new fields and prevents possible distortions due to low patent propensity rates.

## 2.3(b) USPTO patent applications

**Definition:** The indicator is the number of patent applications at the US Patent and Federal Mark Office (USPTO) in high-technology patent classes, per million population.

**Advantages and disadvantages:** This indicator is limited to rapidly growing patent classes where innovation is science-driven and where a high percentage of all innovations are probably patented. This limitation acts to both measure inventive activity in the most promising new fields and prevent possible distortions due to low patent propensity rates.

### Transmission and Application of Knowledge

3.	Transmission and Application of Knowledge	Basis	Interpretation
3.1	SMEs innovating in house	Innovating companies as a % of total SMEs in the BMW Region	
3.2	SMEs innovating co-operation	Innovating companies as a % of total SMEs in the BMW Region	
3.3	Innovation expenditures	Innovation expenditure as a % of sales of responding companies	All firms with 20+ employees

*Note: Innovative companies:*

*New or radically changed products/processes introduced*

*New markets entered – where – within the last 3 years*

*Radically new organisational structures set up within the last 3 years*

## 3.1 SMEs innovating in-house

**Definition:** The CIS defines innovative manufacturing firms quite broadly as those who introduced new products or processes developed by other firms, in-house or in combination with other firms.

**Advantages and disadvantages:** The major disadvantage is that the definition of an “innovation” is open to subjective interpretation, although the survey does give several examples and tries to limit innovation to “significant” technical improvements or advances.

### 3.2 Manufacturing SMEs involved in innovation co-operation

**Definition:** The indicator is the percentage of all manufacturing SMEs (including non-innovators) that had any co-operation agreements on innovation activities with other independent enterprises or institutions in the three years before the survey.

**Advantages and disadvantages:** The main advantage of this indicator is that it is based on a simple yes or no question and the definition of innovation cooperation is relatively straightforward.

### 3.3 Innovation Expenditures

**Definition:** Innovation expenditures includes the full range of innovation activities: in-house R&D, extramural R&D, machinery and equipment linked to product and process innovation, spending to acquire patents and licenses, industrial design, training, and the marketing of innovations. Total innovation expenditure by all firms in each country is divided by total turnover.

**Advantages and disadvantages:** The indicator partly overlaps with indicator 2.2 on R&D expenditures. A better version would exclude R&D, but concerns over data reliability have prevented this option. The question also suffers from relatively high item non-response, indicating that many respondents found it difficult to answer these questions. The advantage of this indicator is precisely that it includes all innovative activities.

#### ***Innovation Finance, Output and Markets***

4.	Innovation Finance, Output and Markets	Basis	Interpretation
4.1	High technology venture capital investment	High technology venture capital investment as a % of GDP in the BMW Region	This indicator measures the supply of private venture capital to new technology-based firms
4.2	Capital raised on parallel markets + new firms on main markets	New capital raised as % of GDP in the BMW Region	New capital is a major source of investment for many firms, but particularly for fast growing firms in high-technology sectors.
4.3	"New to market" products	Innovation expenditure as a % of sales <sup>2</sup> of responding companies	With the exception of Italy, the sales share for new-to-market products lies within a narrow range of between 2.6% - 9.8%
4.4	Home internet access	Households with Internet access as a % of total households in the BMW Region	Internet use by the domestic population is a measure of the ability to access an enormous wealth of data online, including business-to-consumer e-commerce and government-to-citizen online services.
4.5	The importance of ICT markets	Share of Information and Communications Technology (ICT) markets as a % of GDP	ICT is a fundamental feature of knowledge-based economies and the driver of current and future productivity improvements.
4.6	Share of manufacturing value added in high-tech sectors	Share of manufacturing value added in high-tech sectors as a % of value added in the region	Value-added is the best measure of manufacturing output, whereas other indicators such as total production can be biased by "screwdriver" plants with little value-added.

## 4.1 High Tech venture capital investment

**Definition:** This indicator measures venture capital by GDP in high-technology firms active in the following sectors: computer related fields, electronics, biotechnology, medical/health, industrial automation and financial services. Venture capital is the sum of early stage capital (seed and start-up) plus expansion capital. The indicator is limited to venture capital in high-technology sectors for two reasons: these areas are the drivers of current and future innovation across many different sectors and venture capital investments in retail services, tourism or transport are considerably less likely to involve technical innovation.

**Advantages and Disadvantages:** The main disadvantage is that there are many alternative methods of financing new technology-based start-up firms that are not covered by this indicator. An additional concern is the lack of information on the accuracy of the venture capital data.

## 4.2 New capital raised on stock markets

**Definition:** This indicator is the amount of new capital raised by domestic firms on domestic stock markets as a percentage of GDP. It excludes investment funds and unit trusts. And, in order to focus the indicator on new innovative firms, the indicator excludes capital raised by existing firms on the main stock exchanges. Three types of new capital are included:

- Capital raised by newly-admitted firms to the main stock exchanges
- Capital raised on parallel markets by already listed firms
- Capital raised on parallel markets by newly-admitted firms.

**Advantages and disadvantages:** This indicator has several disadvantages. The indicator is strongly influenced by volatility in capital markets. It includes stocks that have little to do with technology, and the results will be distorted by firms raising capital in foreign markets.

## 4.3 “New-to-market” products

**Definition:** data source and year. This CIS-2 indicator provides the percentage of all 1996 (or 1998, where relevant) product sales, by manufacturing firms with more than 20 employees, from innovations that are new to the firm’s market. These are limited to products that are both new to the firm itself and new to the firm’s market.

**Advantages and disadvantages:** This is a direct output measure of innovation that is not distorted by market speculation (as would the market value of a firm). The product must be new to the firm, which in many cases will also include innovations that are world-firsts. The main disadvantage is that there is some ambiguity in what constitutes a “new-to-market” innovation.

#### 4.4 Home Internet access (% of all households)

**Definition:** This indicator shows the percentage of citizens who have Internet access at home. All forms of use are included. Population considered is equal to or over 15 years old. This indicator is equivalent to the “structural indicator 2.4b.

**Advantages and disadvantages:** In the future, much more sophisticated measures of Internet use will be needed. Better data is needed on what the Internet is used for and if the population is aware of several efficiency enhancing uses.

#### 4.5 Share of ICT markets (% GDP)

**Definition:** This indicator is equivalent to the Commission’s structural indicator 2.3. It measures total expenditures on Information and Communication Technology (ICT) as a percentage of GDP. ICT includes office machines, data processing equipment, data communication equipment and telecommunications equipment, plus related software and telecom services.

**Advantages and disadvantages:** An indicator for ICT investment is crucial for capturing innovation in knowledge-based economies, particularly due to the diffusion of new IT equipment, services, and software. One disadvantage of this indicator is that it is obtained from private sources/with a lack of good information on the reliability of the data. A second disadvantage, as noted in the discussion of trends, is that investment could vary depending on the installed base

#### 4.6 Per cent of manufacturing value-added in high-tech sectors

**Definition:** This indicator is the percentage of total value-added in manufacturing in four high-technology industries: pharmaceuticals (NACE 2421), office equipment (NACE 30), telecommunications and related equipment (NACE 32) and aero-space (NACE 35.3). The EU mean is limited to results in the 10 EU countries for which data is available.

**Advantages and disadvantages:** The requirement for good data on added value creates a lag of two or more years longer than for GDP and other economic data. The main disadvantage of the main indicator is that a hollowing-out of manufacturing, as in the UK, can lead to relatively good results, if low and medium technology industries no longer survive. This problem does not affect the Trend indicator.



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