Statistics in focus

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Innovation activity in the new Member States and Candidate Countries

Activity, co-operation and sources

This publication presents results from innovation surveys carried out in the new Member States (except Malta and Cyprus) and Candidate Countries (except Bulgaria and Croatia). Some of the results are compared with an EU average for the old Member States (EU-15 excluding Ireland, Luxembourg and the United Kingdom). The main topics covered by the publication are:

- How many enterprises innovate
- Co-operation in innovation activity
- Sources of information for innovation
- Innovation expenditure.

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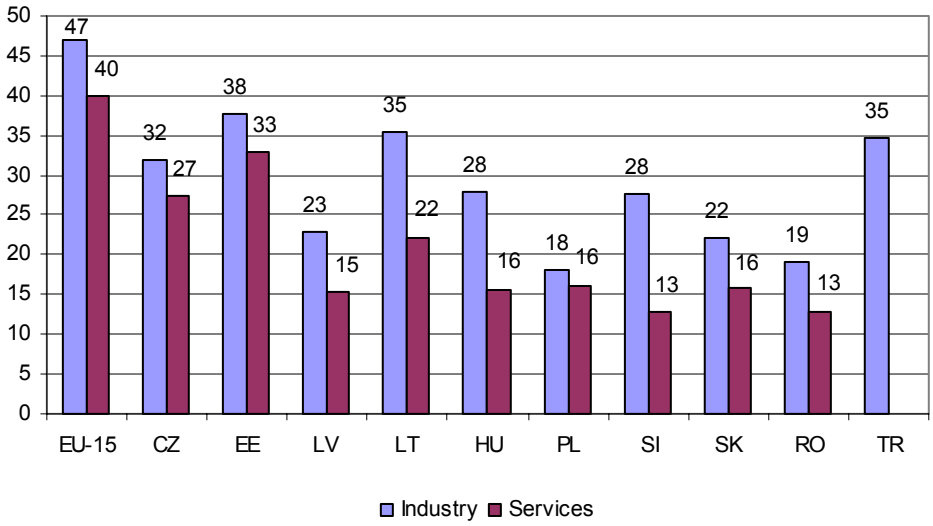
Enterprises with innovation activity

Figure 1: Enterprises with innovation activity, by sector (% of all enterprises)



Note: Data for Hungary do not include Mining and Quarrying. Data for Turkey only include Manufacturing.

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Table 1: Enterprises with innovation activity, as a percentage of all enterprises, by sector and size-class

Nace	Size-class	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Total	Small	39	25	31	14	21	21	13	13	15	13	:
	Medium	60	42	48	33	40	28	25	28	24	21	:
	Large	77	66	75	58	64	44	53	55	47	41	:
	All	44	30	36	19	28	23	17	21	19	17	:
Industry	Small	40	25	32	17	26	25	11	14	15	15	31
	Medium	63	42	48	35	44	32	26	33	26	22	39
	Large	80	68	79	62	64	46	57	62	50	42	50
	All	47	32	38	23	35	28	18	28	22	19	35
Services	Small	36	25	30	12	19	15	15	12	15	11	:
	Medium	54	42	49	29	33	17	21	16	19	20	:
	Large	69	53	64	49	65	37	32	26	31	34	:
	All	40	27	33	15	22	16	16	13	16	13	:

Note: Data for Hungary do not include Mining and Quarrying. Data for Turkey only include Manufacturing.

The most common indicator for innovation activity is the share of innovative enterprises in the economy. Figure 1 shows the percentage of enterprises with innovation activity. Estonia has the highest share of innovating enterprises among the new Member States (with 36% of enterprises with innovation activity), followed by the Czech Republic at 30% and Lithuania at 28% (see table 1). However this was considerably lower than the EU-15 average of 44%. At the other end are Poland and Romania with the lowest rates of innovation activity, both with 17% of enterprises with innovation activity.

Estonia also had the highest percentage of enterprises with innovation activity in both the industrial (38%) and services' (33%) sectors, but these are again lower than the EU-15 average where the figures are 47% and 40% respectively. Poland (18%) had the lowest share of innovators in industry while Romania and Slovenia (13% each) were the lowest in services.

For all countries, the rate of innovation activity is higher in industry than in services, highly so in Slovenia (with a difference of 15 percentage points between the two sectors) and Lithuania (13 points difference). Poland had the smallest difference between the two sectors (2 percentage points difference) while the Czech Republic and Estonia both had a difference of only 5 percentage points.

For all countries (and for the EU-15) there is a marked size effect: larger enterprises being more innovative than the medium-sized ones, with these more innovative than the small enterprises. The effect is true in both sectors, but more significant among industrial enterprises. For example, Estonia has a rise from a 32% rate of innovation activity in small industrial enterprises to 48% for medium-sized and 79% for large enterprises.

Table 2 (page 3) shows enterprises which introduced new or improved products that were also new for the market (the market is defined as the enterprise's main market), as a percentage of all enterprises with innovation activity. An interesting observation is that Slovenia had a fairly low rate of "new to enterprise" innovators, but a remarkable high share of them are "new to the market" innovators, 61% for both sectors together. Estonia (with a high rate of "new to enterprise" innovators) has, on the other hand, a relatively low rate of "new to market" innovators, 39%.

In the industrial sector the share of "new to market" innovators (as a % of innovation active enterprises) ranged from 58% and 48% respectively for Slovenia and Latvia to 15% for Romania and 21% for Turkey. In the services sector the figures are more or less at the same level and Slovenia again had the highest percentage of innovating enterprises with "new to the market" products (at 69%) while Romania had the lowest (at 11%).

There is also a tendency, in the industrial sector for the proportion of "new to market" innovators to be higher among the large enterprises. For example Romania shows a difference of 21 percentage points between the percentages of small enterprises with such “new to the market” products, as compared to the large enterprises. However this is not always true; in Latvia, Slovenia and Turkey the shares are higher among the small enterprises than the large ones. In the service sector the structure is quite different across the countries, and there is no general size effect.

Table 2: Enterprises which introduced new or improved products for the market, as a percentage of innovation active enterprises, by sector and size-class

Nace	Size-class	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Total	Small	:	35	39	44	46	39	:	67	36	11	:
	Medium	:	41	36	46	47	23	:	56	46	17	:
	Large	:	46	45	46	47	39	:	57	49	33	:
	All	:	38	39	45	46	35	:	61	41	14	:
Industry	Small	:	30	33	50	39	38	:	62	39	12	22
	Medium	:	41	34	46	49	22	24	55	46	17	18
	Large	:	47	46	45	48	42	23	58	49	33	21
	All	:	36	34	48	45	34	23	58	44	15	21
Services	Small	:	42	46	35	50	40	:	73	34	9	:
	Medium	:	41	41	47	40	35	:	65	48	16	:
	Large	:	42	42	48	43	17	:	46	49	28	:
	All	:	42	45	39	48	38	:	69	37	11	:

Note: Data for Hungary do not include Mining and Quarrying. Data for Turkey only include Manufacturing.
Data for Poland only include medium-sized and large enterprises.

Co-operation in innovation

Co-operation in innovation activity is considered important in the new Member States and candidate countries. For example 55% of industrial enterprises with innovation activity in Hungary reported that they had co-operated with other partners in their innovation activity (see table 3), while Slovenia also reported a high rate of 47%. On the other hand only 19% of Romanian enterprises co-operated with other partners. However it is remarkable that even the share for Romania is higher than the EU-15 average of 17 percent.

The fairly low rate for EU-15 is caused by a low level of co-operation among small and medium-sized enterprises. For large enterprises the level in EU-15 is at the same level as in the new Member States and candidate countries. There is also a clear size effect in these countries; enterprises with more than 249 employees have much more co-operation than the smaller enterprises. One reason could be that large enterprises perform more advanced innovations and for that reason need more co-operation with others and larger enterprises may also have a larger of network of partners.

In the services sector co-operation is also important. Latvia and Lithuania both had approximately 60% of innovative enterprises co-operating with partners (62% for Latvia and 57% for Lithuania), while Slovakia had only 16% of its enterprises doing likewise. In some cases there was a marked difference between the two sectors with Latvia having a much higher rate in

services, as compared to industry (62% and 41% respectively). In other cases the rates were virtually the same, as for the Czech Republic and Estonia.
The size effect is more or less the same as for industry with the largest difference by size in the service sector in Slovakia (8% of innovative active enterprises in the small size class with a partner as compared with 58% in the large size class).

Table 3: Enterprises with co-operation arrangements on innovation activities, as a percentage of all innovation active enterprises, by sector and size-class

Nace	Size-class	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Total	Small	14	20	31	45	49	48	26	36	12	17	:
	Medium	24	26	39	49	44	56	36	49	31	22	:
	Large	57	40	67	68	60	73	49	55	46	39	:
	All	19	24	35	49	48	52	32	46	24	22	:
Industry	Small	11	22	27	31	38	52	19	36	17	12	:
	Medium	22	23	38	48	38	58	27	47	29	18	:
	Large	61	40	68	66	59	71	48	55	45	38	:
	All	17	25	34	41	41	55	28	47	28	19	:
Services	Small	18	18	35	65	56	40	33	37	8	27	:
	Medium	29	36	41	52	58	43	61	62	37	36	:
	Large	47	39	67	74	67	86	52	54	58	47	:
	All	22	22	37	62	57	42	40	43	16	31	:

Note: Data for Hungary do not include Mining and Quarrying.

Sources of information

The most important source of information for innovation active enterprises was information within the enterprise (see tables 4a and 4b), as is the case for the EU-15. This is particularly true in the service sector where all countries, except two (Lithuania and Slovenia) reported information within the enterprise as the most important source. In the tables the percentages differ considerably across the countries, but one should focus on the ranking of the specified sources.

Of external sources, clients or customers was the most important source of information, both in industry and services. In the Czech Republic, Hungary, Lithuania and Slovenia, industrial enterprises reported this as more important than sources within the enterprises.

Suppliers of equipment etc, competitors and fairs and exhibitions are also sources frequently cited as highly important, but, in general, not so important as the enterprise itself and clients/customers.

Universities, higher education institutes and other research institutes are generally considered the least important sources of information for innovation by enterprises, with no country (except for Lithuania) having more than 9% of enterprises considering these sources as highly important. In Lithuania however these sources are reported as quite important, together with professional conferences.

Table 4a: Enterprises indicating high importance of selected sources of information, as a percentage of all innovation active enterprises in industry

	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Within the enterprise	37	31	33	33	8	64	58	26	49	33	47
Other enterprises within the enterprise group	7	8	12	4	1	6	17	4	7	3	12
Suppliers of equipment, materials, components or software	19	20	25	24	10	33	13	18	21	27	23
Clients or customers	27	38	23	26	10	77	50	28	42	28	36
Competitors and other enterprises from the same industry	11	16	9	14	13	50	24	20	27	13	17
Universities or other higher education institutes	4	5	1	1	13	8	4	5	4	4	6
Government or private non-profit research institutes	3	1	1	1	11	9	8	2	4	3	4
Professional conferences, meetings, journals	9	23	6	10	14	26	19	8	9	13	11
Fairs and exhibitions	17	19	15	15	8	35	31	19	27	24	29

Table 4b: Enterprises indicating high importance of selected sources of information as a percentage of all innovation active enterprises in services

	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Within the enterprise	40	40	42	48	4	63	55	20	54	48	:
Other enterprises within the enterprise group	13	10	20	14	3	5	31	8	10	5	:
Suppliers of equipment, materials, components or software	20	22	26	24	11	34	28	13	19	38	:
Clients or customers	31	33	27	27	9	56	46	25	33	32	:
Competitors and other enterprises from the same industry	14	18	13	15	11	41	34	17	20	13	:
Universities or other higher education institutes	6	3	2	4	10	0	2	3	7	9	:
Government or private non-profit research institutes	3	2	1	2	9	6	2	2	6	8	:
Professional conferences, meetings, journals	15	14	12	17	14	25	25	7	13	21	:
Fairs and exhibitions	14	14	13	16	14	23	27	8	15	26	:

Note: Data for Hungary do not include Mining and Quarrying. Data for Turkey only include Manufacturing.

Innovation expenditure

Table 5 gives some information on innovation expenditure as a percentage of total turnover for innovation active enterprises. Slovakia and Latvia show the highest percentage of expenditure, at 6% and 5%, while the Czech Republic is the lowest, at 2%. Other countries vary from 3% (Estonia) to 4% (Hungary) but the differences are not great.

In the industrial sector, Latvia and Slovakia had the highest percentage of expenditure (6% each) while the Czech Republic had the lowest with only 2%. In the services sector, Poland had the highest percentage (5%) while Hungary and the Czech Republic were the lowest at 1%.

At the sectoral level, all countries had higher relative innovation expenditure in industry than in services, except for Romania (3% in industry against 4% in services) and Poland (4% in industry against 6% in services). While most countries showed a 1 or 2 percentages difference between the two sectors, the difference for Hungary was the largest with 4% in industry and 1% in services.

Innovation expenditure was also generally higher for smaller enterprises. For example small enterprises in Slovenia spent the equivalent of 6% of turnover on innovation while large enterprises only spent 3%. This pattern was true for nearly all countries, except for Slovakia where small enterprises spent 1% while large enterprises spent 6%. In the service sector the pattern is more varied, with no size effect apparent. One should notice that the percentages refer to innovation active enterprises only. The percentages would have been lower if referring to all enterprises and, due to the lower rate of innovation activity among small enterprises, the structure across the size-classes would also have been different.

For most countries the main cost component of innovation expenditure is the acquisition of machinery followed by intramural R&D.

Table 5: Innovation expenditure as a percentage of turnover for innovation active enterprises, by sector and size-class

Nace	Size-class	EU-15	Czech Republic	Estonia	Latvia	Lithuania	Hungary	Poland	Slovenia	Slovakia	Romania	Turkey
Total	Small	:	4	3	7	4	4	:	6	1	5	:
	Medium	:	2	3	7	4	2	:	3	5	5	:
	Large	:	2	2	5	2	4	:	3	6	3	:
	All	:	2	3	5	3	4	:	3	6	3	:
Industry	Small	:	7	6	16	7	5	7	5	4	7	:
	Medium	:	3	4	10	6	2	5	3	5	5	:
	Large	:	2	2	3	2	5	3	3	6	2	:
	All	:	2	3	6	3	4	4	3	6	3	:
Services	Small	:	2	2	3	4	2	4	6	0	4	:
	Medium	:	1	2	4	2	2	6	1	5	5	:
	Large	:	1	2	7	2	1	6	2	7	4	:
	All	:	1	2	5	2	1	6	2	5	4	:

Note: Data for Hungary do not include Mining and Quarrying.

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

In all the countries, the innovation survey has been based on the Community Innovation Survey (CIS), and except for Poland, on the last survey implemented, CIS3. The national questionnaires are very close to the common CIS 3 questionnaire worked out by Eurostat, but in some countries there are some minor deviations. The survey in Poland is mainly based on CIS2, but many variables are comparable with CIS3. The CIS is based on the Oslo manual (second edition from 1997), which gives methodological guidelines and defines basic innovation concepts. The reference period for the innovation survey data presented is usually 1998-2000 (Estonia, Slovenia and Turkey) or 1999-2001 (the Czech Republic, Hungary, Latvia, Lithuania and Slovakia). For Poland the reference period for industry is 1998-2000 and for services is 1997-1999. For Romania the reference period is 2000-2002. Bulgaria launched a survey for the period 2001-2003, but the results are not available yet. The EU figures generally covered the period 1998 to 2000. It is the national statistical institute that was responsible for the innovation survey in all countries and, for a majority of the countries, this was their first full scale survey on innovation.

Target population

The enterprise was the statistical unit for observation in all countries, except for Turkey where the establishment (local-kind-of-activity unit) was used. All countries covered enterprises with all least 10 employees and the results presented are grossed up figures for the whole population. Most countries have strictly followed the recommended coverage of NACE-classes for CIS3 (see box). Only Turkey has excluded several NACE-classes in its survey, mainly in the services sector. In Hungary section C (Mining and quarrying) has been left out, in Poland division 73 (Research and development) and in Slovakia group 74.3 (Technical testing and analysis). Poland also excluded enterprises with less than 50 employees from NACE C and E.

Mining and quarrying	Section C
Manufacturing	Section D
Electricity, gas and water supply	Section E
Wholesale trade	Division 51
Transport, storage and communication	Section I
Financial intermediation	Section J
Computer and related activities	Division 72
Research and development	Division 73
Architectural and engineering activities	Group 74.2
Technical testing and analysis	Group 74.3

Survey method

The survey method used is normally a combination of a census of large enterprises and a stratified sampling of the smaller enterprises. In Estonia, Slovenia and Turkey (services sector) a census has been undertaken for all enterprises (>10 employees). In all countries the data was collected via a postal survey. In most countries the survey was mandatory for the enterprises, except in Estonia, Hungary and Turkey. Hungary and Turkey had response rates below 40 % while in the other countries the response rate varies from 63 to 88 %. This is, on average, considerably higher than in CIS 3 for the EU Member states where the response rate was approximately 55%.

Innovation

An *innovation* is a new or significantly improved product (good or service) introduced to the market or the introduction within an enterprise of a new or significantly improved process. Innovations are based on the results of new technological developments, new combinations of existing technology or the utilisation of other knowledge acquired by the enterprise. Innovations may be developed by the innovating enterprise or by another enterprise; however, purely selling innovations wholly produced and developed by other enterprises is not included as an innovation activity. Innovations should be new to the enterprise concerned; for product innovations they do not necessarily have to be new to the market and for process innovations the enterprise does not necessarily have to be the first to have introduced the process.

A *product innovation* is a product (good or service), which is either new or significantly improved with respect to its fundamental characteristics, technical specifications, incorporated software or other immaterial components, intended uses, or user friendliness. Changes of a solely aesthetic nature are not included.

A *process innovation* includes new and significantly improved production technology, methods of supplying services and of delivering products. The outcome (of the process) should be significant with respect to the level of output, quality of products or costs of production and distribution. Purely organisational or managerial changes are not included.

Enterprises with innovation activity

Enterprises that have had any kind of innovation activity during the survey period, i.e. have introduced or implemented new products and/or processes and/or have had on-going and/or abandoned innovation activity.

Successful innovators

Enterprises that have introduced or implemented new products and/or processes.

Size classes

The following size classes, based on the number of employees, were used for the compilation of aggregated results:

Small enterprises	10 to 49 employees
Medium-sized enterprises	50 to 249 employees
Large enterprises	250 or more employees

In this publication: : not available

The data used for this publication were extracted on 15 June 2004.

Further information:

- **Databases**

  EUROSTAT Website/Science and technology/Survey on innovation in EU enterprises

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