

**Third KEI workshop**  
**March 2-3 2006, Helsinki**

**“Globalisation of R&D:  
Policy issues, measurement needs and  
indicator development?”**



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# **Measuring globalisation of R&D**

**\*\*\*\*\***

**the Polish experience**

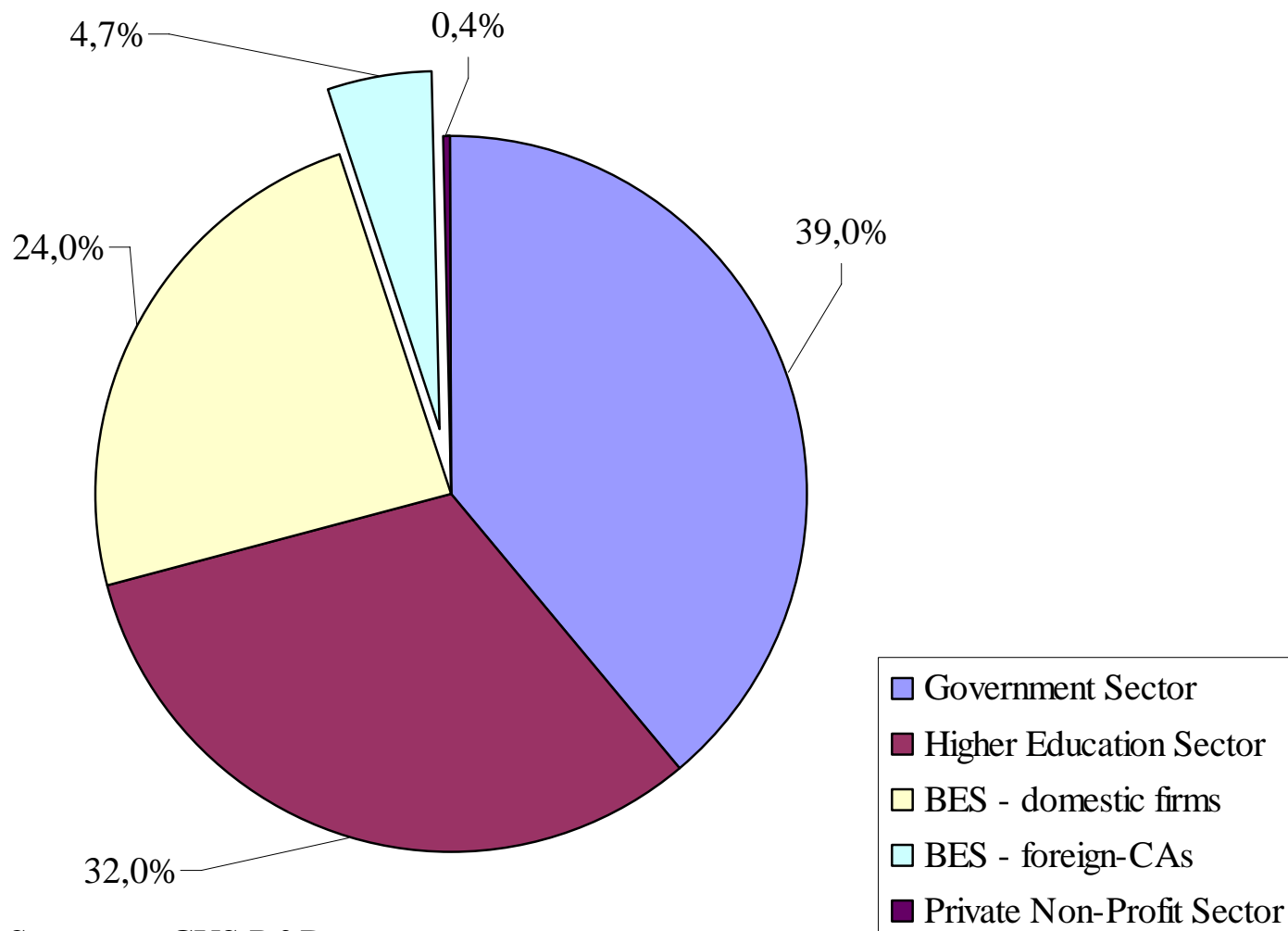
- **R&D survey based on the *Frascati Manual* recommendations has been carried out in Poland since 1994 as a reference year.**
- **Since the very beginning, breakdown by type of ownership (public vs. private; domestic vs. foreign) is one of the most important.**

- **Information on the type of ownership is derived from an official national business register (REGON) and special derivative (systematically updated) database established for statistical purposes (BJS).**
- **Information on the country of control is derived from the KZ survey - Survey on activity of foreign capital companies (Polish FATS-type survey covering all units with foreign participation).**

- **The country of control is determined using the criterion of shares (it is also possible to use the criterion of voting power).**
- **Ultimate beneficiary owners (UBO) criterion can also be used to identifying foreign owned firms.**

- **It seems, that we are now in Poland in the turning point as regards the R&D sphere in our country.**
- **Until quite lately, Polish R&D system was rather autarkical characterized by low share of foreign R&D funding and low share of R&D performed in Poland by foreign affiliates.**

**Figure 1.**  
**GROSS DOMESTIC EXPENDITURE ON R&D (GERD) BY SECTOR**  
**OF PERFORMANCE, 2004**

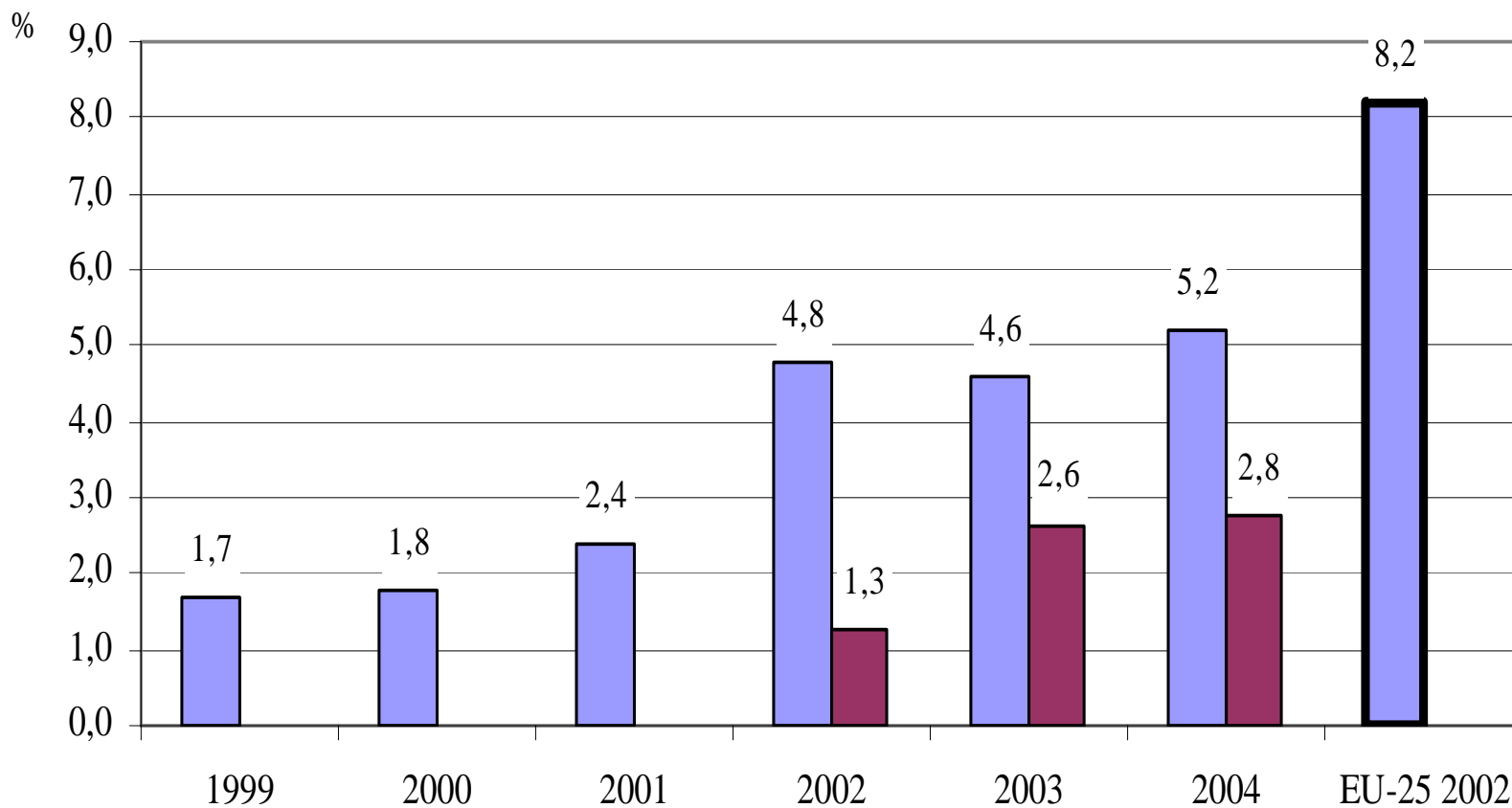


Source: GUS R&D survey.



**Figure 2.**

**R&D EXPENDITURE FUNDED FROM ABROAD AS A % OF GERD**

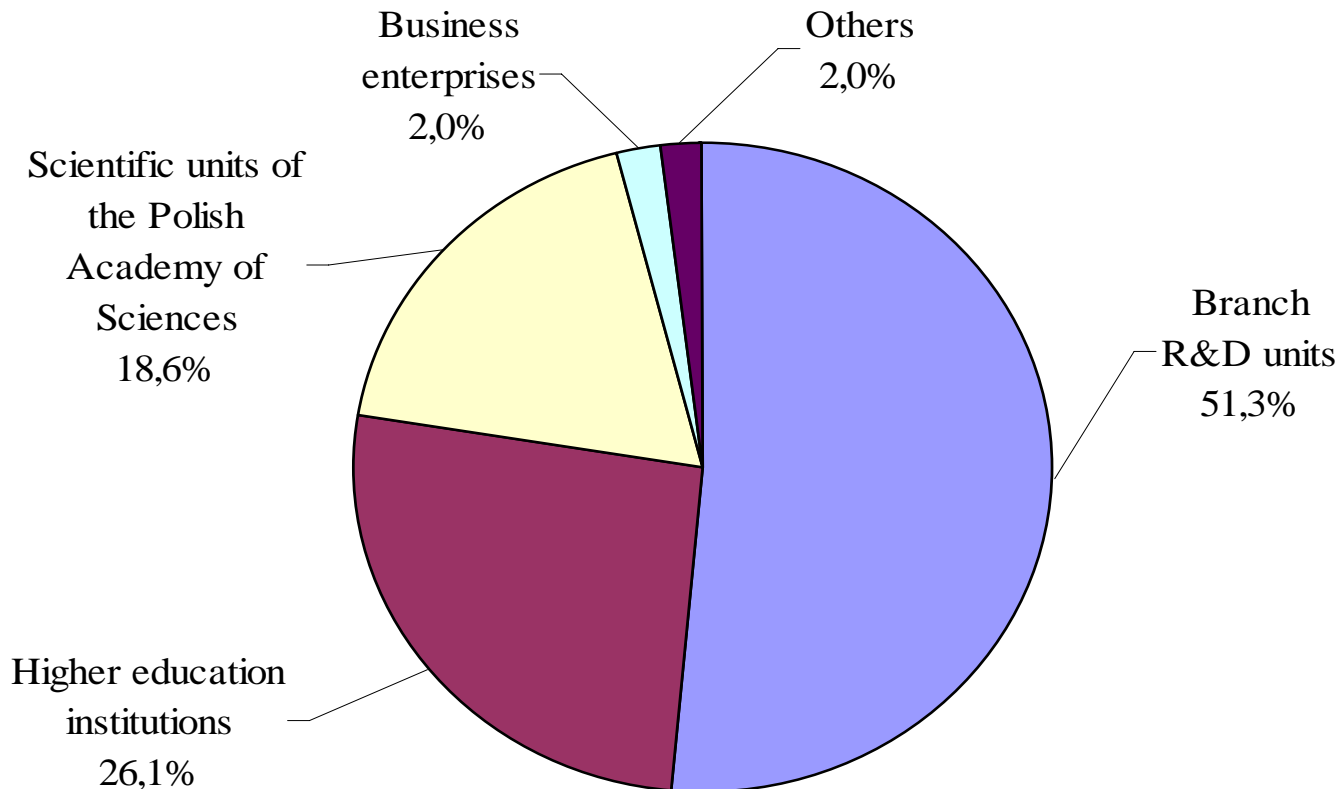


Source: GUS R&D survey.

■ Total    ■ of which funds from the EU

**Figure 3.**

**GERD FUNDED FROM ABROAD BY TYPE OF PERFORMING UNITS, 2004**



Source: GUS R&D survey.

- **In 2004, citizens of other countries constituted somewhat less than 1 per cent of the total number of researchers in Poland (in terms of HC).**
- **A very important role in the Polish R&D system is played by the Higher Education Sector; higher education institutions are among the top R&D spenders; HES is very dynamic and thriving sector now.**

- **Other characteristic features (problems) of the Polish R&D system:**
  - ♪ **Underdevelopment of the Business Enterprise Sector,**
  - ♪ **Inefficient system of commercialization of knowledge – converting output of public R&D institutions into new products and processes (innovations) is a vulnerable spot of the Polish S&T system.**
- **In consequence, the main goal for policy-making in Poland is to encourage business enterprises, of which foreign-owned firms, to perform and financially support R&D activities.**

- **At present, the process of entering foreign actors performing R&D is becoming intensified.**
- **It seems to be an element of the process of relocation of services (at first, there were mostly accountancy centres that were established in Poland by MNEs).**
- **In some recent years significant number of foreign renowned companies established R&D centres in Poland - among others such as:**

- ✓ Motorola, IBM, **Delphi Automotive System** (the top R&D spender among foreign-CAs in 2004), ABB, Lurgi and Pliva in **Cracow**,
- ✓ Samsung Electronics, Oracle, General Electric Aircraft Engines, SAS Institute, Avon, Cederroth and LG Electronics in **Warsaw** and neighbouring area (Mazowieckie voivodship),
- ✓ CapGemini, Siemens and Remy Internationale in **Wroclaw**,

- ✓ Intel in **Gdansk**,
- ✓ Lucent Technologies in **Bydgoszcz** (the oldest foreign R&D centre in Poland established in the early part of the decade of 1990s),
- ✓ Pratt & Whitney in **Rzeszow** (in so-called Aircraft Valley in South-Eastern Poland),
- ✓ Ontrack in **Katowice**.

- **Establishing R&D centres in Poland by foreign companies is rather quite a new phenomenon.**
- **In the previous period, the process of acquiring Polish enterprises performing R&D by foreign firms (M&A) was more frequent than the a.m. one (abandonment of R&D activity in Polish firms acquired by new foreign owners took also place very often then; a lot of businesses were closed down).**



- **Software development is becoming Polish *specialite de la maison*** – Polish programmers are ranked at the top positions in the worldwide international competitions in this field such as TopCoder or International Team Programming Contest (Warsaw University is ranked higher than MIT).

- **According to Richard Lada, head of Motorola Polska, foreign companies attempt now to make use of „natural talent” for informatics a lot of Polish people have.**
- **Microsoft has recently taken a decision to establish, by the end of 2006, Software Development Centre in Warsaw (it will be the third Microsoft’s R&D centre abroad; the other two are in Germany and the UK).**

- **As far as we know, Polish firm is also one of the important suppliers of software for Nokia.**

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- **On the other hand, the chances are that we are now on the eve of the opposite process – the process of expanding some Polish companies abroad, of which to perform R&D there.**

- **As impressive examples may be mentioned:**
  - ♪ **BIOTON – biotechnological firm that has developed Polish recombinant human insulin (Gensulin®), the sole Polish, and one of few worldwide, producers of recombinant human insulin or**
  - ♪ **ComArch – „infant prodigy” of the Jagiellonian University (UJ) in Cracow (spin-off firm by Prof. Filipiak, ComArch CEO and founder); today, Comarch is the leading software house in Central & Eastern Europe and employs highly experienced IT engineers and business consultants who staff an international network of subsidiaries and offices throughout the US, Europe and the Middle East.**

- **At this moment, ComArch is organizing an international research centre in Warsaw which is planned to be a venue for scientists from all over the world - a kind of international centre of excellence in computer science, software engineering and IT business.**

- **According to the results of the last, fourth survey of the managers of 500 top companies in Poland „CEO Challenge 2005” by The Conference Board and CapGemini Polska, the most important challenge and task for Polish companies in forthcoming future is – in their managers opinion – expansion of their activities abroad, first of all in Europe and Asia.**

- **According to the data collected by the NBP (National Bank of Poland), 2004 was the peak year as regards the amount of Polish direct investment abroad.**

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- **As matters stand, the very important task for Polish R&D statistics in forthcoming future is:**
  - ♪ **continuous improvement of measuring inward R&D,**
  - ♪ **methodological work on how to capture outward R&D by Polish companies (the first attempt – *vide infra*).**

**Table 1. BERD (million PLN, current prices) by type of ownership**

Specification	Number of units	Expenditures (BERD)	
		total	of which budgetary funds
<b>2002</b>			
<b>TOTAL</b> .....	<b>428</b>	<b>980,5</b>	<b>115,5</b>
Enterprises - total .....	337	640,7	43,1
Private ownership .....	239	424,5	11,0
with domestic participation <sup>a</sup> .....	204	327,0	9,8
<b>with foreign participation<sup>b</sup></b> .....	<b>35</b>	<b>97,5</b>	<b>1,2</b>
State ownership .....	98	216,2	32,1
Other units <sup>c</sup> .....	91	339,8	72,4
<b>2003</b>			
<b>TOTAL</b> .....	<b>548</b>	<b>1249,7</b>	<b>190,0</b>
Enterprises - total .....	446	759,9	60,0
Private ownership .....	332	552,7	18,8
with domestic participation <sup>a</sup> .....	288	436,6	18,6
<b>with foreign participation<sup>b</sup></b> .....	<b>44</b>	<b>116,1</b>	<b>0,2</b>
State ownership .....	114	207,2	411,2
Other units <sup>c</sup> .....	102	489,8	130,0
<b>2004</b>			
<b>TOTAL</b> .....	<b>587</b>	<b>1478,7</b>	<b>250,4</b>
Enterprises - total .....	481	886,3	59,8
Private ownership .....	366	678,7	16,6
with domestic participation <sup>a</sup> .....	306	437,1	16,2
<b>with foreign participation<sup>b</sup></b> .....	<b>60</b>	<b>241,6</b>	<b>0,4</b>
State ownership .....	115	207,6	43,2
Other units <sup>c</sup> .....	106	592,4	190,6

*a* More than 50 per cent of domestic participation. *b* More than 50 per cent of foreign participation. *c* Branch R&D units (state owned units whose main activity is performing R&D for the benefit of national economy, subordinate to different ministries - in the bulk to the Ministry of Economy).



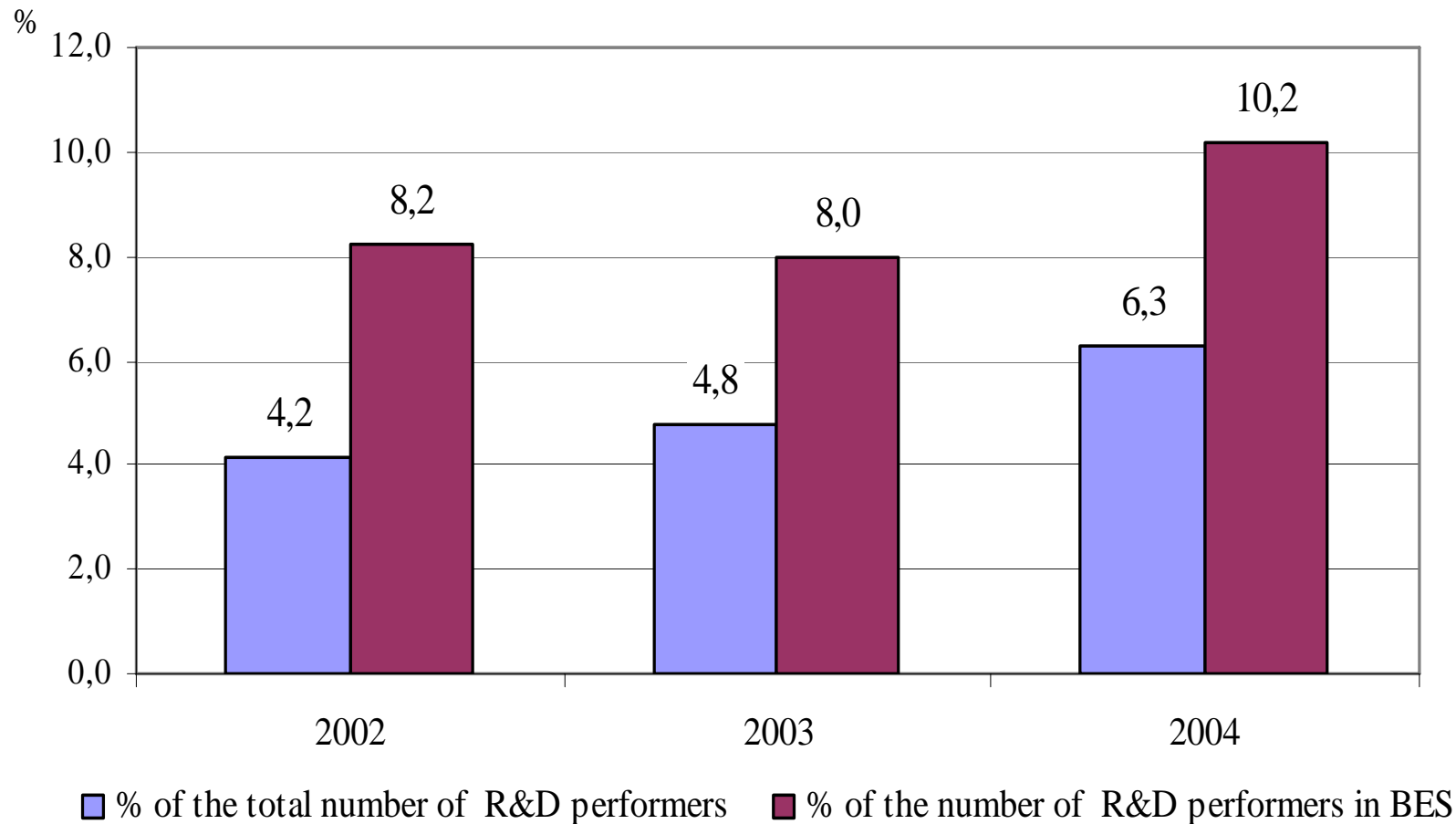
**Table 2. Business Enterprise R&D personnel (FTE) by type of ownership**

Specification	Number of units	R&D personnel	
		total	RSE
<b>2002</b>			
<b>TOTAL</b> .....	<b>428</b>	<b>8499,7</b>	<b>4686,4</b>
Enterprises - total .....	337	5252,3	2968,8
Private ownership .....	239	3120,8	1744,8
with domestic participation <sup>a</sup> .....	204	2497,0	1319,3
<b>with foreign participation<sup>b</sup></b> .....	<b>35</b>	<b>623,8</b>	<b>425,5</b>
State ownership .....	98	2131,5	1224,0
Other units <sup>c</sup> .....	91	3247,4	1717,6
<b>2003</b>			
<b>TOTAL</b> .....	<b>548</b>	<b>11377,8</b>	<b>6828,5</b>
Enterprises - total .....	446	6213,8	3749,8
Private ownership .....	332	4110,8	2549,7
with domestic participation <sup>a</sup> .....	288	3253,5	1961,8
<b>with foreign participation<sup>b</sup></b> .....	<b>44</b>	<b>857,3</b>	<b>587,9</b>
State ownership .....	114	2103,0	1200,1
Other units <sup>c</sup> .....	102	5164,0	3078,7
<b>2004</b>			
<b>TOTAL</b> .....	<b>587</b>	<b>12977,9</b>	<b>8334,2</b>
Enterprises - total .....	481	6893,1	4664,8
Private ownership .....	366	4859,2	3350,5
with domestic participation <sup>a</sup> .....	306	3477,2	2314,3
<b>with foreign participation<sup>b</sup></b> .....	<b>60</b>	<b>1382,0</b>	<b>1036,2</b>
State ownership .....	115	2033,9	1314,3
Other units <sup>c</sup> .....	106	6084,8	3669,4

*a* More than 50 per cent of domestic participation. *b* More than 50 per cent of foreign participation. *c* Branch R&D units (state owned units whose main activity is performing R&D for the benefit of national economy, subordinate to different ministries – in the bulk to the Ministry of Economy).

**Figure 4.**

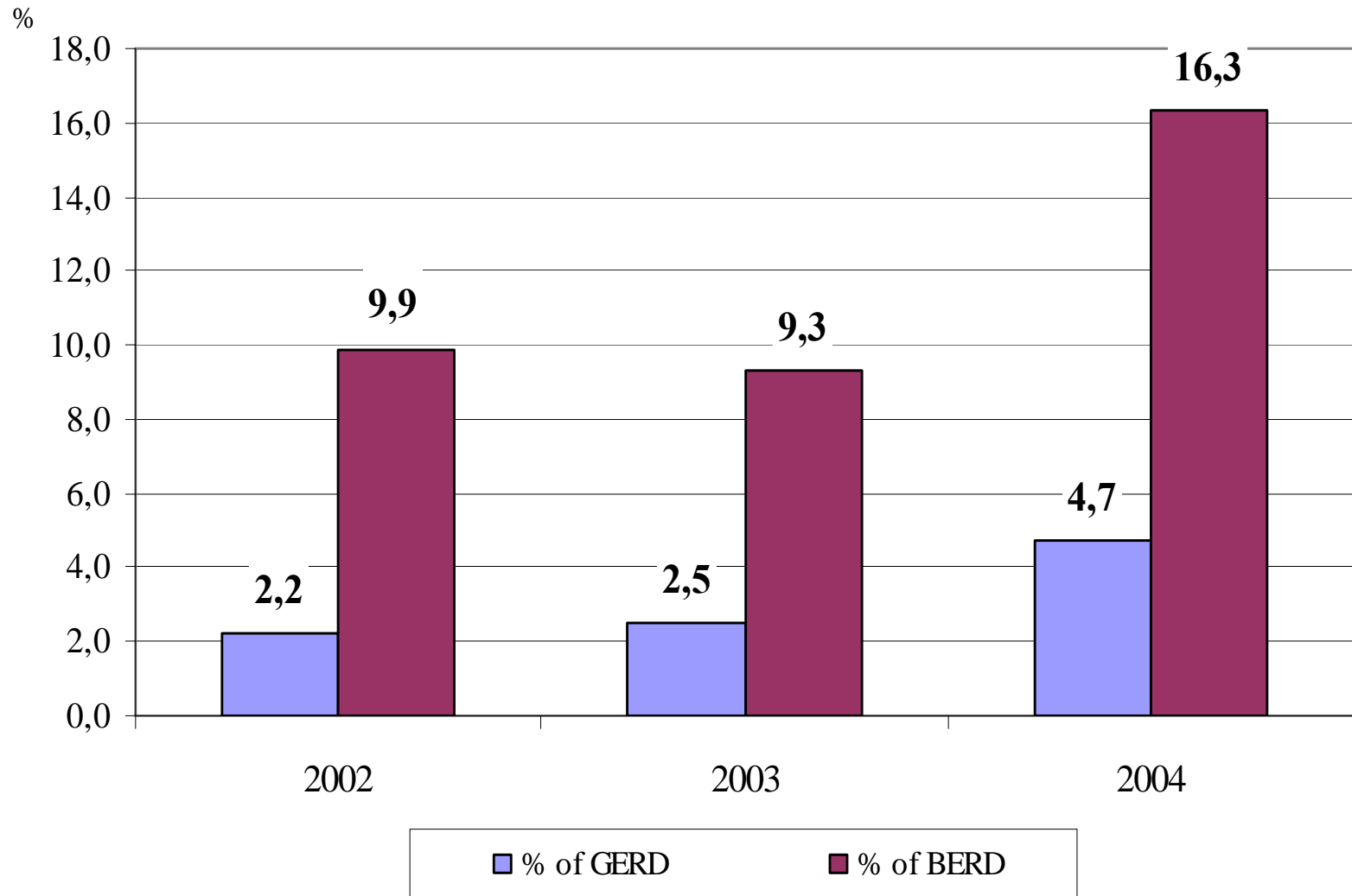
**NUMBER OF FOREIGN-CONTROLLED AFFILIATES PERFORMING R&D  
IN POLAND AS A % OF THE TOTAL NUMBER OF R&D PERFORMERS**



Source: GUS R&D survey.

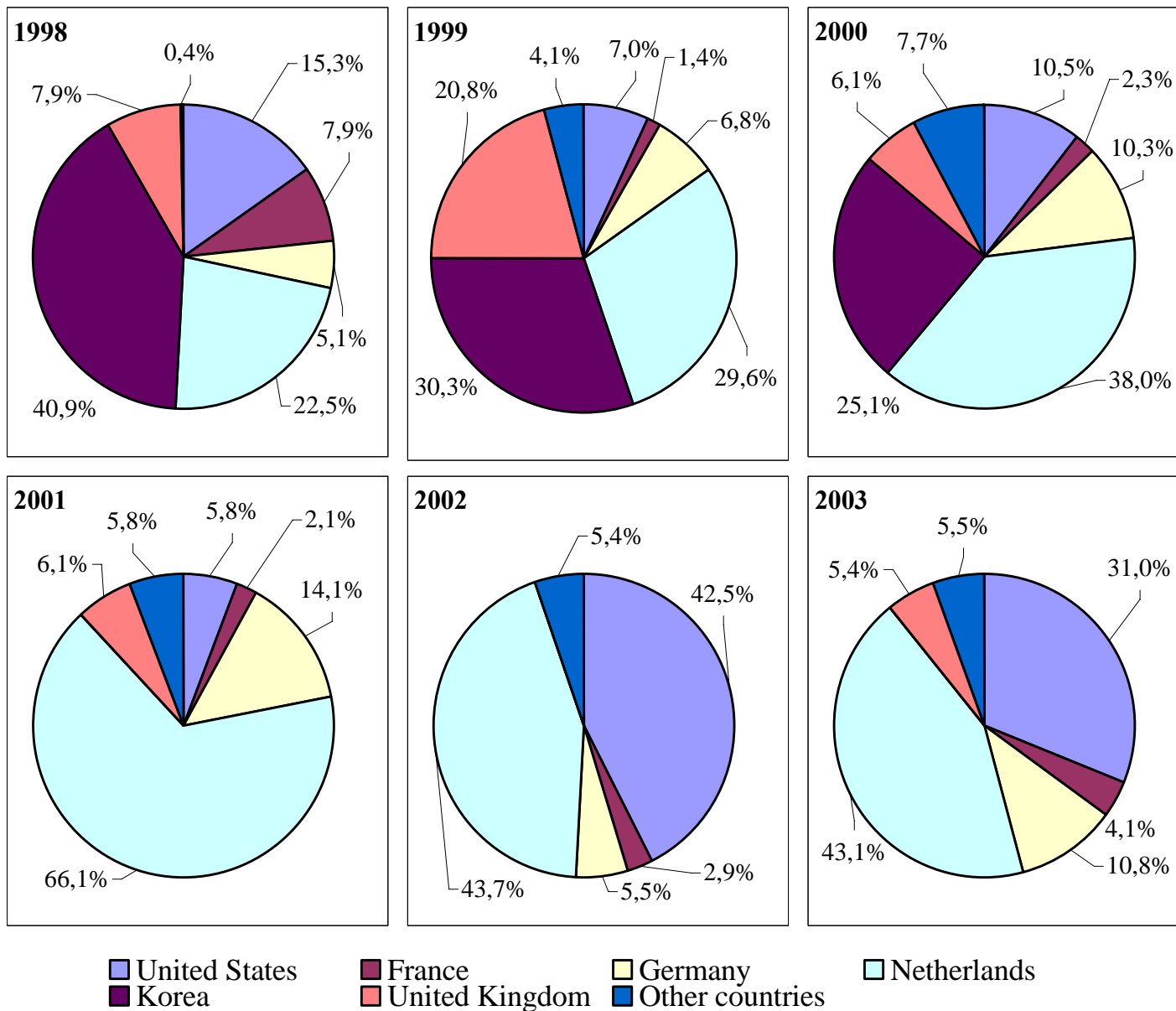
**Figure 5.**

**R&D EXPENDITURES IN FOREIGN-CAs PERFORMING R&D IN POLAND**



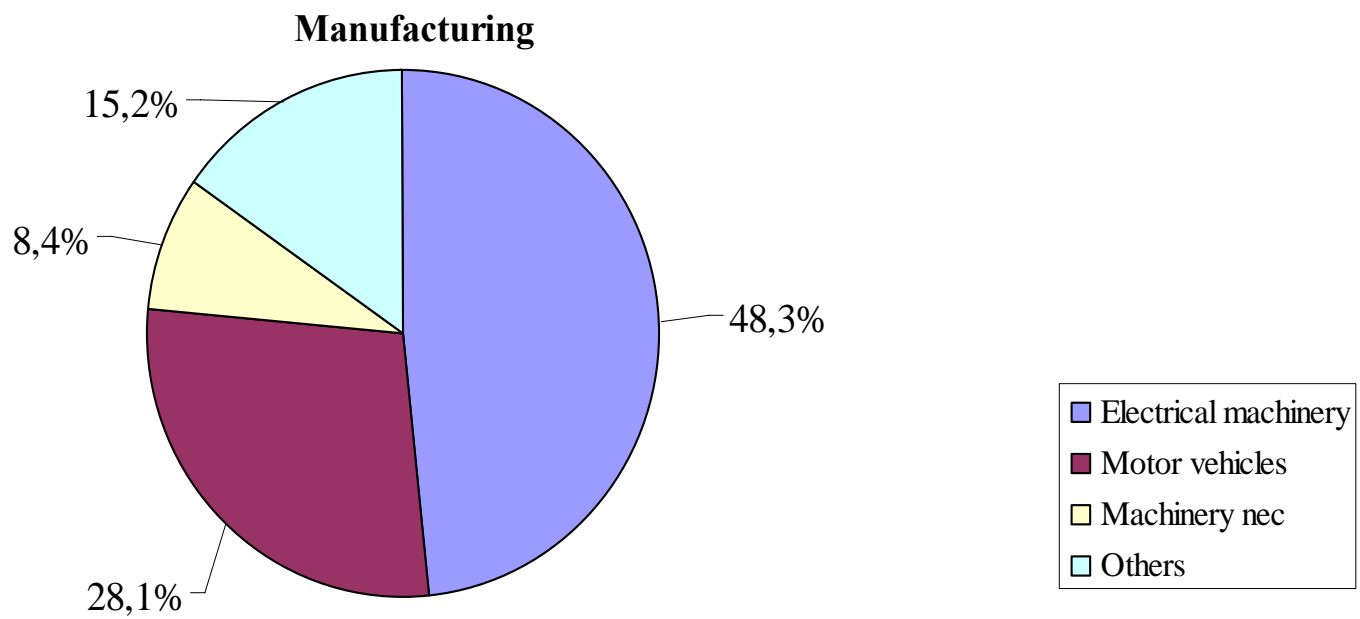
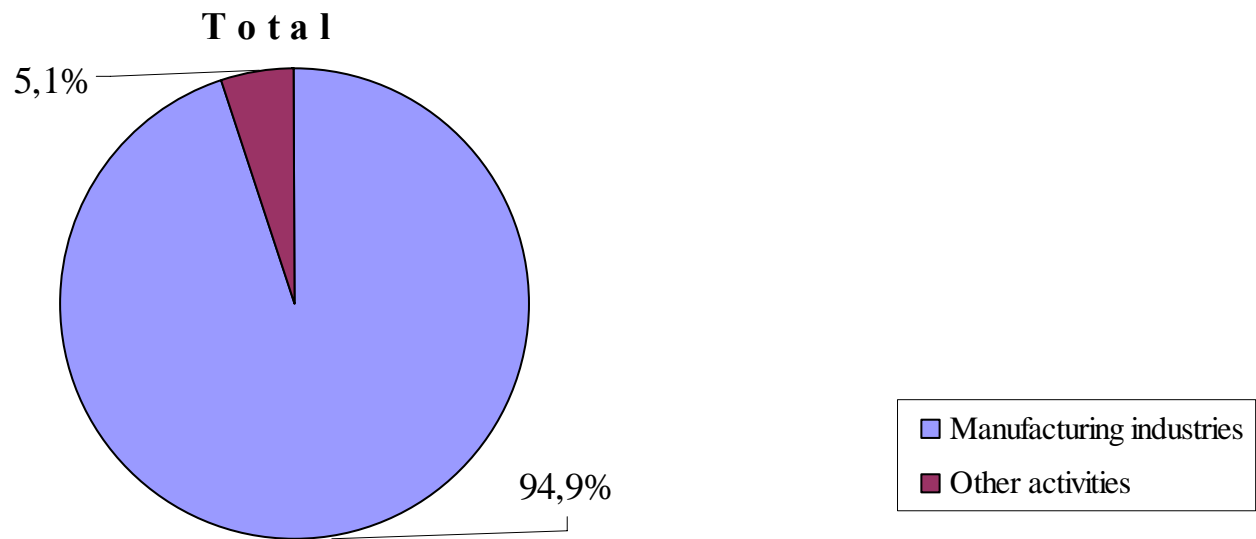
**Figure 6.**

**R&D EXPENDITURE IN FOREIGN-CONTROLLED AFFILIATES PERFORMING R&D IN POLAND BY COUNTRY OF CONTROL, 1998-2003**



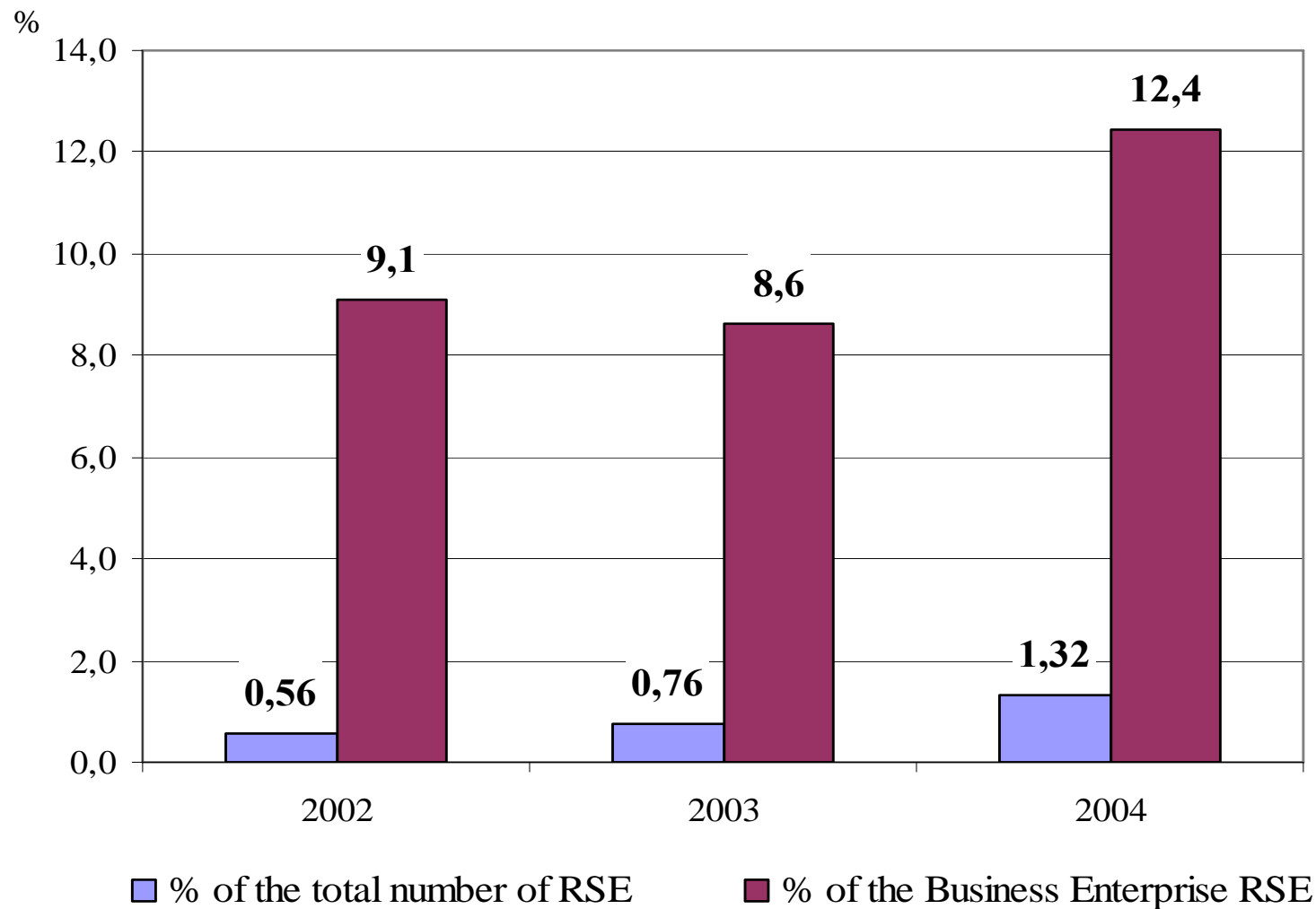
**Figure 7.**

**R&D EXPENDITURE IN FOREIGN-CONTROLLED AFFILIATES BY TYPE OF ACTIVITY, 2003**

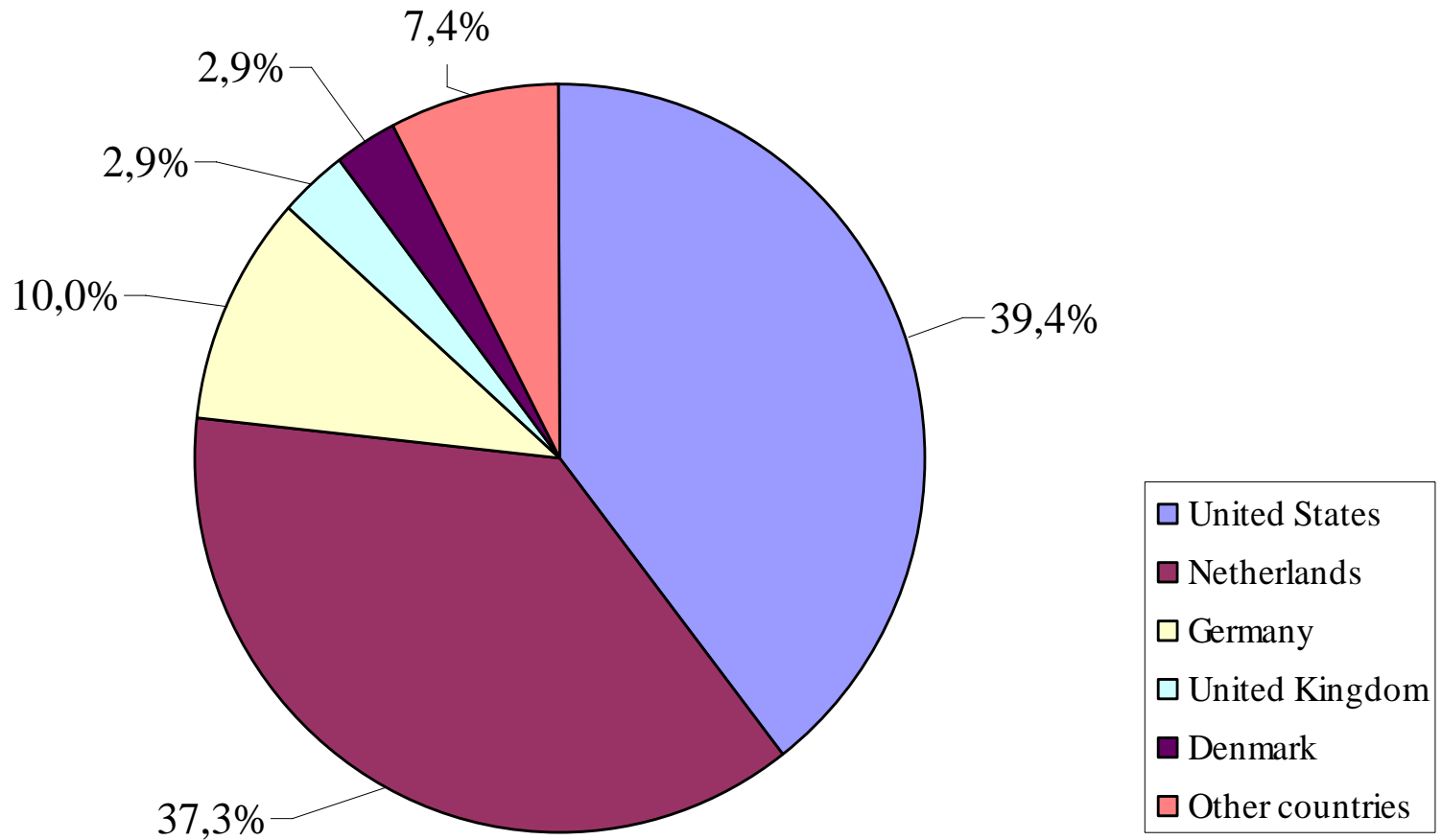


**Figure 8.**

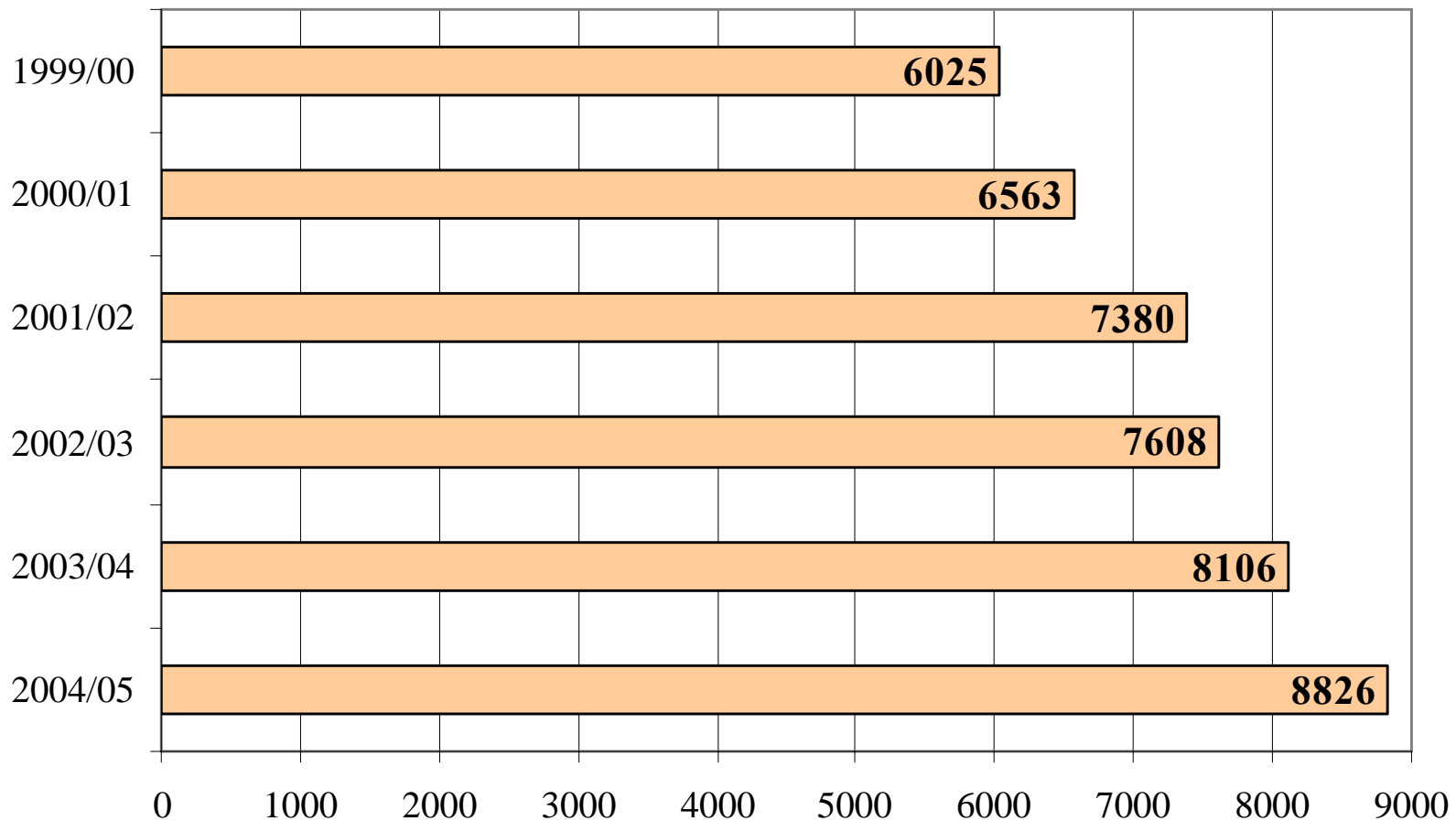
**RESEARCHERS (FTE) IN FOREIGN-CAs PERFORMING R&D IN POLAND**



**Figure 9.**  
**RESEARCHERS (FTE) IN FOREIGN-CONTROLLED AFFILIATES**  
**PERFORMING R&D IN POLAND BY COUNTRY OF CONTROL, 2003**



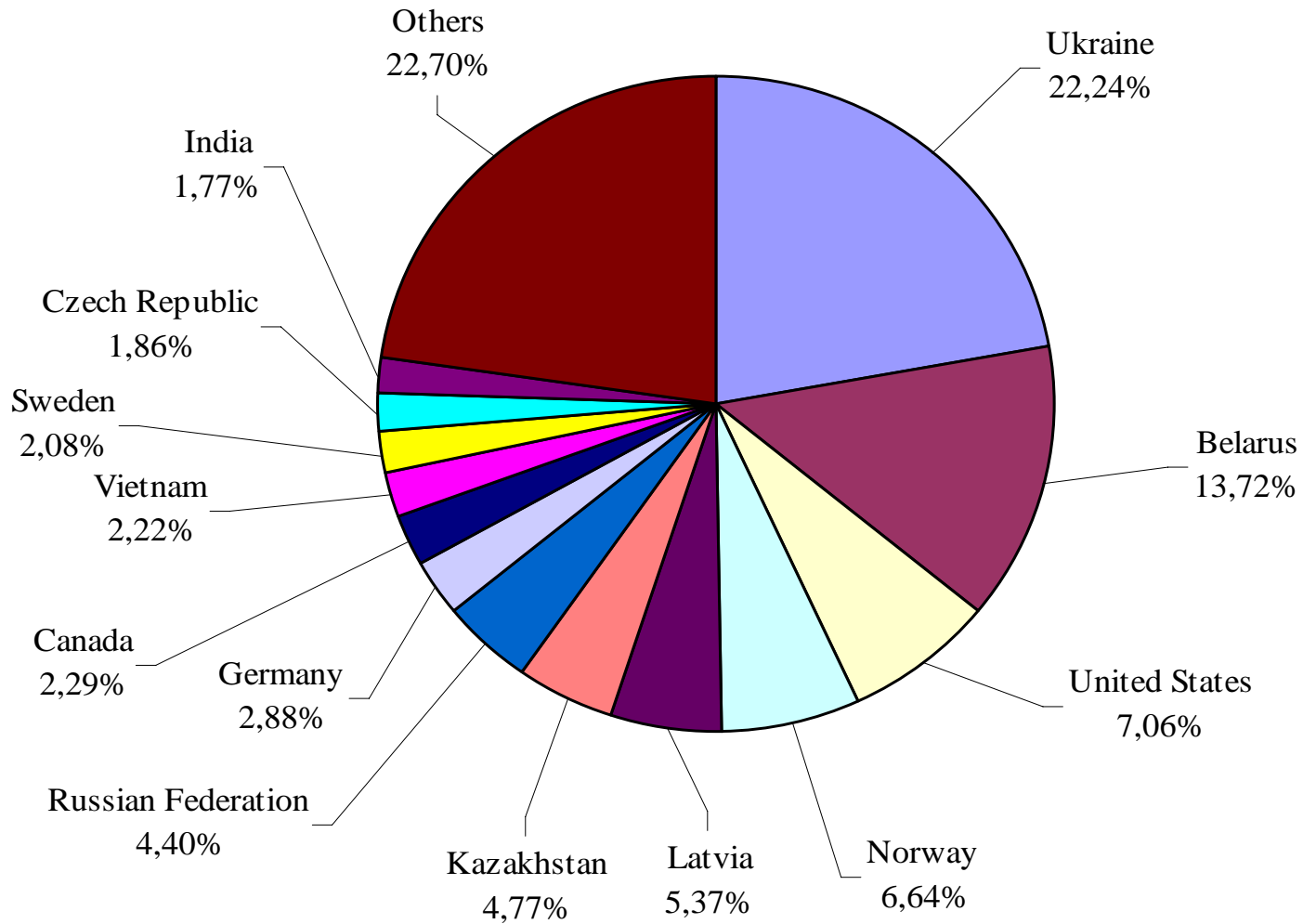
**Figure 10.**  
**FOREIGN STUDENTS IN TERTIARY EDUCATION, SCHOOL**  
**YEARS 1999/2000-2004/05**



**In 2004/05, foreign students in tertiary education accounted for 4,6 %  
of the overall student population.**



**Figure 11.**  
**FOREIGN STUDENTS IN TERTIARY EDUCATION BY COUNTRY OF ORIGIN,**  
**SCHOOL YEAR 2004/05**



## **Main results from the GUS *ad hoc* survey on outward R&D**

- **It was a short „reconnoitring” survey based to a great extent on the Statistics Finland’s methodology.**
- **The surveyed population was a small number of technology-based companies performing R&D that have recently succeeded in their endeavours to enter international markets.**



- **Nowadays, the main goal of Polish companies expanding their activities abroad and building foreign affiliates is to entry onto world markets with Polish innovative products developed by themselves (the case of ComArch) or in co-operation with Polish scientific institutions (the case of BIOTON working in close co-operation with the Institute of Biotechnology and Antibiotics in Warsaw, IBA) (outward R&D as a kind of by-work).**
- **There are also firms that are organizing now foreign affiliates first of all to perform R&D there (the case of BUMAR setting up at present subsidiaries in Ukraine to conduct R&D there using local experience) (R&D as a principal occupation of the foreign subsidiary).**

- **Firms expanding their activities abroad plan to conduct R&D activity in foreign affiliates first of all in order to:**
  - ♪ **give support to local production and marketing,**
  - ♪ **get into closer contact with important markets and to**
  - ♪ **acquire technology.**
- **Important motive missing – co-operation better than rivalry (competition).**



- **R&D personnel is considered to be a variable that is easier to providing data than R&D expenditure.**
- **As regards the reliability of the picture of R&D activities' country division by foreign affiliates given by the two a.m. variables (personnel vs. expenditure), opinions vary (R&D personnel seem to have a little advantage over the latter variable).**
- **Interrogated firms were rather not eager to reveal their plans concerning R&D activities abroad in voluntary telephone interview. Such information is considered to be confidential although possible to transmit for research purposes on certain conditions.**



# Główny Urząd Statystyczny



*Dziękuję za uwagę !*

*Thank you for your attention !*

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