CENTRAL STATISTICAL OFFICE

MAIN SCIENCE & TECHNOLOGY INDICATORS

IN POLAND IN 2000–2003

WARSAW 2005

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Economic Statistics Division and
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PREFACE

Main Science and Technology Indicators in Poland in 2000–2003 is the second statistical publication in English describing the Polish science and technology system (STS).

The first publication entitled *Main Science and Technology Indicators in Poland in 1990s* was issued by the Central Statistical Office of Poland in 2001.

Science and technology are generally recognized as important strategic factors determining the future development and welfare of nations. The terms "knowledge society" and "knowledge-based economy" have recently been coined in order to bring into relief this crucial role of scientific knowledge and innovation in economic progress and social development.

In Poland, the institution responsible for the collection of information on the science and technology system is the Central Statistical Office (denoted by its Polish acronym: GUS). For some time past, the Ministry of Science and Information Society Technologies (MNiI), co-author of this publication, has also contributed to this work.

Some fields of science and technology statistics in Poland, especially R&D and innovation surveys, have a very long and rich tradition going back to the early 1960s. This tradition is now blossoming, against a background of a tremendous rise in interest in science and technology problems among the Polish society and a steadily increasing demand for science and technology statistical data. Science, technology and innovation issues have been put at the top of the agenda in recent times in Poland.

Since the mid-1990s, GUS has made considerable efforts to extend the coverage of its R&D/S&T statistics and improve their quality and international comparability.

In preparing science and technology statistics and developing science and technology indicators GUS complies with OECD and Eurostat recommendations and instructions.

The publication provides a selection of the most relevant data on the scientific and technological performance of Poland in the period under review.

It covers such topics as:

- resources devoted to research and development (R&D) activity (expenditure and personnel),
- innovation activities — as defined by the so-called *Oslo Manual methodology (Oslo Manual* 1997),
- patents,
- technology balance of payments (TBP),
- international trade in high-technology products and employment in high-tech industries and knowledge-intensive services (HT&KIS),
- human resources for science and technology (HRST),
- bibliometrics,
- IC technologies in industrial enterprises and households as well as
- participation of Polish organizations in international co-operation in science and technology.

The publication summarizes reports on science and technology in Poland published yearly by the Central Statistical Office (the recent one: *Science and technology in Poland in 2003* was issued at the beginning of 2005).

Data presented in this publication are fully in line with internationally agreed definitions and classifications contained in the *Frascati Family Manuals* and other OECD and Eurostat methodological documents.

To compile indicators describing both input and output sides of the S&T activities and so-called national innovation systems, diverse data sources are used.

In this publication, apart from data derived from different surveys carried out by GUS, there are used data originating from other sources, such as the Ministry of Science and Information Society Technologies (MNiI), Patent Office of the Republic of Poland (UP RP), National Bank of Poland (NBP), the Chancellery of the President of the Republic of Poland as well as World Intellectual Property Organization (WIPO) and Philadelphian Institute for Scientific Information (ISI).

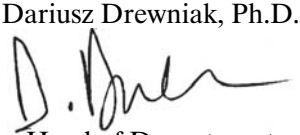
Relatively long time series presented in tables and graphs permits an assessment of the evolution of the Polish S&T system in the recent ten or more years.

In addition, as many international comparisons as possible, based on Eurostat and OECD statistics, have also been included.

The publication tries to provide a picture of strengths and weaknesses of the Polish science and technology system on the eve of the Poland's accession to the EU — at the moment when an in-depth policy debate was launched in order to design a new growth and innovation framework to boost the development of the knowledge-based society in Poland.

The publication has been prepared by the Science & Technology Statistics Section of the GUS Economic Statistics Division (under co-ordination of Dr. Grażyna Niedbalska — Head of the Section) in co-operation with the Department of Science Strategy and Development in the Ministry of Science and Information Society Technologies (under co-ordination of Dr. Roman Sławeta).

Dariusz Drewniak, Ph.D.



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Head of Economic
Statistics Division
(GUS)

Warsaw, July 2005

CONTENTS

LIST OF TABLES

LIST OF FIGURES

Explanation of symbols

Dash (—)	—	the phenomenon did not occur (magnitude zero).
Zero: (0)	—	the phenomenon appears as below 0,5.
(0,0)	—	the phenomenon appears as below 0,05.
Dot (.)	—	data not available or not reliable.
x	—	not applicable.
"Of which"	—	indicates that not all the elements of the sum are given.
Comma (,)	—	used in figures represents the decimal point.

I INTRODUCTORY INFORMATION

INTRODUCTORY INFORMATION

At government level, the Ministry of Science and Information Society Technologies (MNiI) is responsible for designing and implementing the Polish science and technology policy, for competitiveness/innovativeness based on research and development programs and for promoting international co-operation of Poland in science and technology, including EU-related research matters.

The Minister of Science and Information Society Technologies is responsible for two budget sectors: "science" and "information technology". In administering public funds allocated to scientific research the Minister is assisted by the Council for Science which replaced the State Committee for Scientific Research. The Council for Science is an advisory body composed of representatives of scientific circles.

All government support for separately budgeted studies is channelled entirely through the MNiI (except for military R&D projects which are partially financed by the Ministry of Defence). There are six basic channels through which R&D is to be financed:

- core funding for statutory R&D activities, *i.e.* institutional finance provided selectively for designated research establishments, units and university departments for covering costs of their own research activities (schools at university level cannot use those funds to finance their educational or training activities),
- investments in R&D infrastructure such as buildings and equipment,
- peer-reviewed research grants based on research proposals presented by small research teams or individual researchers, no matter where they are employed or what scientific degrees they hold (research projects should deal with new scientific problems and must not be financed from the state budget in any other form),
- subsidies for R&D programs of national importance, commissioned by enterprises, state administration bodies or local authorities (financial means are allocated for implementation of projects and utilization of research findings),
- subsidies for international co-operation in science and technology resulting from intergovernmental agreements,
- subsidies for selected R&D support activities (*e.g.* information services, library facilities, promotion of science).

ADMINISTRATIVE DIVISION OF THE COUNTRY

The territory of the country is divided into 16 voivodships

Territory – 322 577 km^2
Population – 38 191 thous. (2003)

Principal cities in thous. inhabitants (2003):
Warszawa (capital) – 1 690
Łódź – 779
Kraków – 758
Wrocław – 638
Poznań – 574

At the beginning of the so-called transition period the Science & Technology (S&T) system in Poland was seriously affected by economic changes.

During all the second half of the decade of the 1990s, the Polish S&T system was systematically recovering. This positive trend broke down early in the new century due to some economic slowdown that took place at that time. Especially, R&D activity in the business enterprise sector turned out to be very pervious to the business cycle.

One of the most important achievements of the so-called transition period in Poland is significant enhancement of the level of education of Poland's society. The level of education of the Polish population has continued to rise throughout the whole recent period, since the early 1990s.

Rapid increase in the number of students enrolled in tertiary education has been due to both public and private funds. Creation of a great number of

private higher education institutions is often considered to be the most amazing phenomenon in the period of transition in Poland.

Poland is now a top EU country as regards the number of graduates from tertiary education *per* thousand population aged 24–29.

In the global knowledge economy, education is perceived as a key factor in strengthening competitiveness, employment and social cohesion.

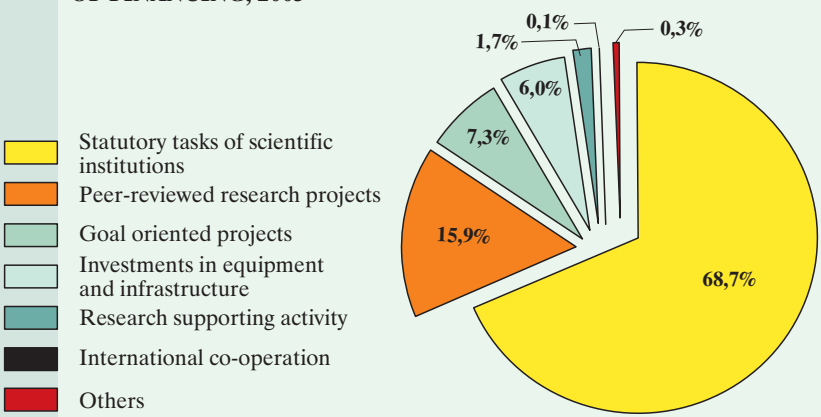
The well-educated young generation is a Poland's strategic advantage and a key asset for further economic, cultural and social development.

Public higher education institutions also proved to be a very dynamic element of the Polish R&D system.

In many fields of science (*e.g.* software engineering, computer sciences, the GRID technology, cardiology, of which cardiosurgery, *etc.*) the quality of Polish research is world-class. In this context it is worthwhile to note that Polish inventors have been, in the recent period, winners of many prizes and medals of prestige at international invention fairs and exhibitions such as the renowned EUREKA in Brussels. In 2004 Polish invention won Grand Prix Brussels Eureka (pneumatic chamber for heart support developed by the team headed by Prof. Zbigniew Religa, Foundation for Cardiosurgery Development, Zabrze).

Polish researchers (RSE) represent a large proportion of the EU researchers' stock. Poland is ranked sixth in the EU-25 as regards the number of RSE expressed in FTE. In computational terms, the number of Polish researchers expressed in FTE represents about 5% (5,1% in 2001) of the total number of EU-25 researchers (see fig. 2.14).

Figure 1.1. GOVERNMENT BUDGET ALLOCATED TO R&D AND RELATED ACTIVITIES (BUDGET SECTOR "SCIENCE") BY CHANNEL OF FINANCING, 2003



Source: MNiI.

According to the general opinion the cognitive aspect of research in the Polish current R&D system is relatively over-hyped. The profit-oriented business in-house R&D capacity should be assessed as rather weak. As yet, the main source of innovation in the Polish business enterprise sector is the acquisition of external technology in an embodied form *id est* acquisition of machinery and equipment with improved technological characteristics and performances.

The weakest point of the Polish S&T system is an inefficient way of turning science into business. To remedy this problem, the process of designing and implementing different policy measures has recently been launched by government bodies in co-operation with non-governmental institutions. The most important goals of this new S&T policy measures are: (1) to encourage the business sector to finance and perform R&D and (2) to promote the utilization of research findings, of which the results of R&D performed by public research institutions.

The new system of the Polish R&D organization and financing the research operates under the Act of 4 November 2004 (Journal of Laws 2004 No. 238) on science financing rules. The Act, in particular, stipulates that:

- criteria and procedures should be established in order to facilitate consolidation of the R&D sector and scientific potential with the economy,
- the Minister of Science and Information Society Technologies can set a national framework program — a basis for financing integrated multidisciplinary research projects,
- another form of public policies is financing the targeted projects — execution of a technical, technological or organizational undertaking that constitutes a basis for practical use in economy, especially in the SMEs sector.

Enterprise-level innovation will be supported by the government. The regulatory authorities consider the issue of fostering innovation and creating attractive framework conditions for innovation processes (the Supporting Innovation Activities Bill had its first reading).

The National Development Plan (2007–2013) was defined in 2004 and covers:

- creating a business environment for innovation (as an element of the National Innovation System), implementing and effecting the economic incentives for public support of innovation and R&D,
- encouraging private funding of R&D (Polish venture capital industry in favour of R&D needs, government programs to encourage private R&D),
- building institutional environment for R&D and innovation (restructuring branch R&D units, co-ordination and support of R&D commercialization),
- building a learning system for the knowledge-based society.

Figure 1.2. POPULATION BY AGE, %, 2002 AND 2003
As of 31 XII

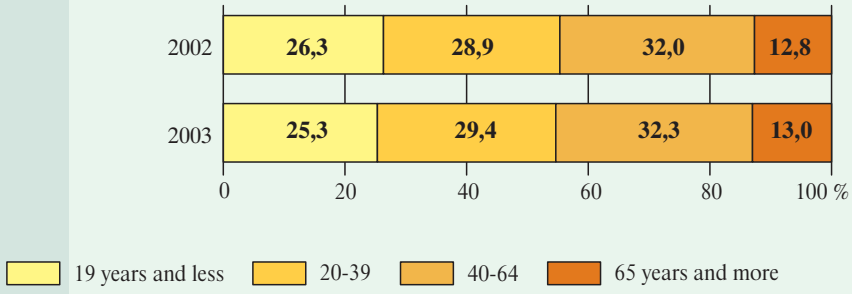


Figure 1.3. INDICES OF GDP (CONSTANT PRICES, PREVIOUS YEAR=100,0), 1997–2003

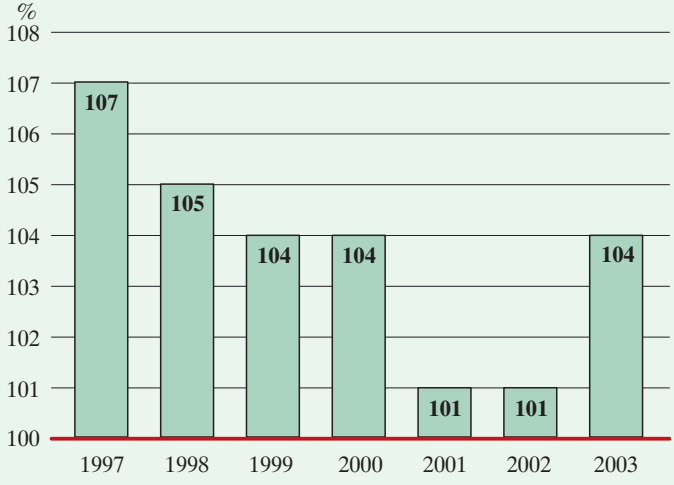
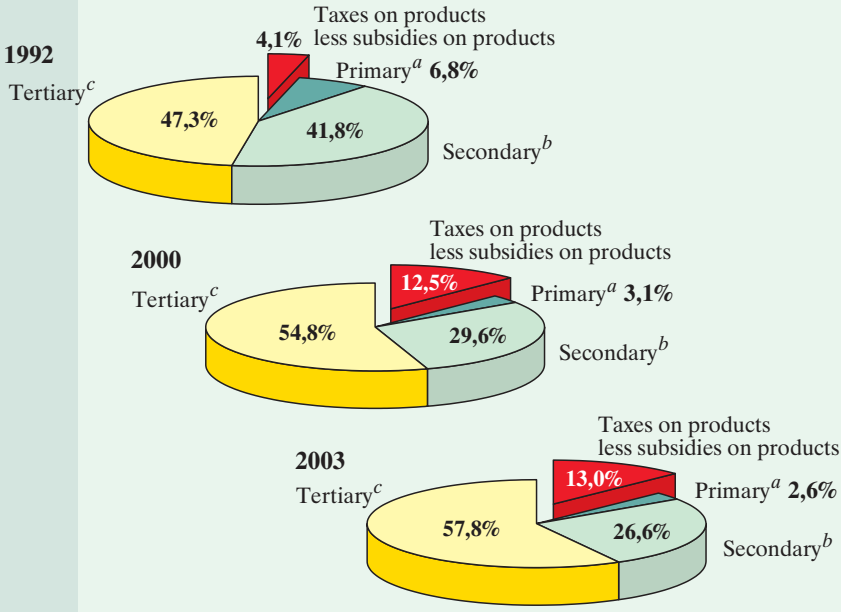
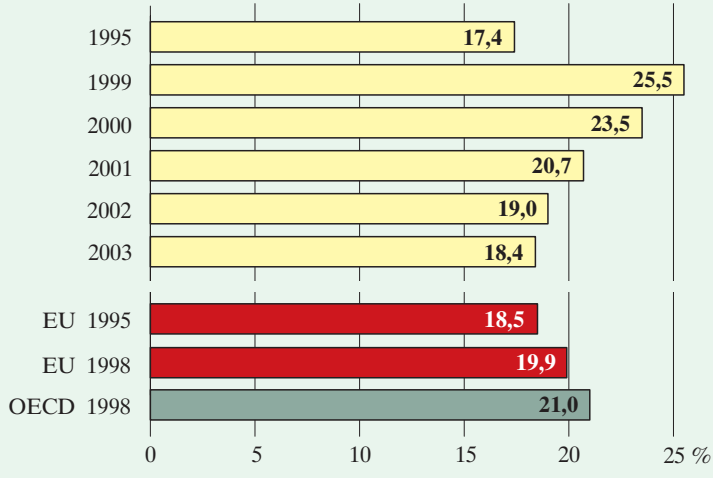


Figure 1.4. GROSS DOMESTIC PRODUCT BY SECTOR OF ACTIVITY (PRIMARY, SECONDARY, TERTIARY), 1992, 2000 AND 2003



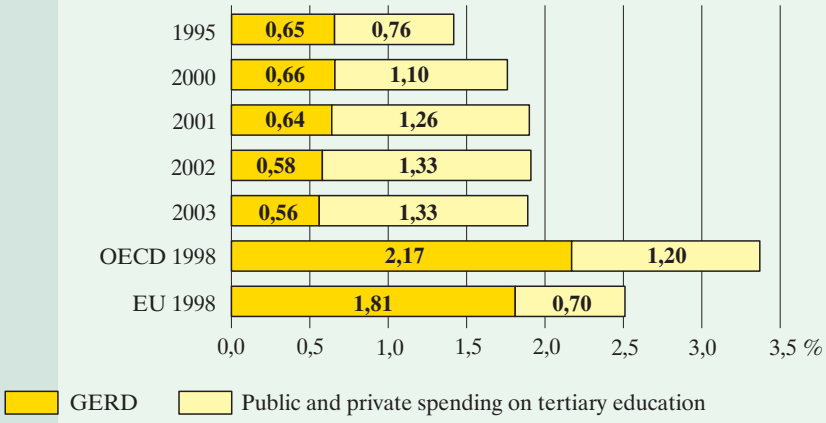
a Agriculture, forestry and fishing. *b* Industry and construction. *c* Services.

Figure 1.5. GROSS FIXED CAPITAL FORMATION (GFCF) AS A % OF GDP (CURRENT PRICES), 1995–2003



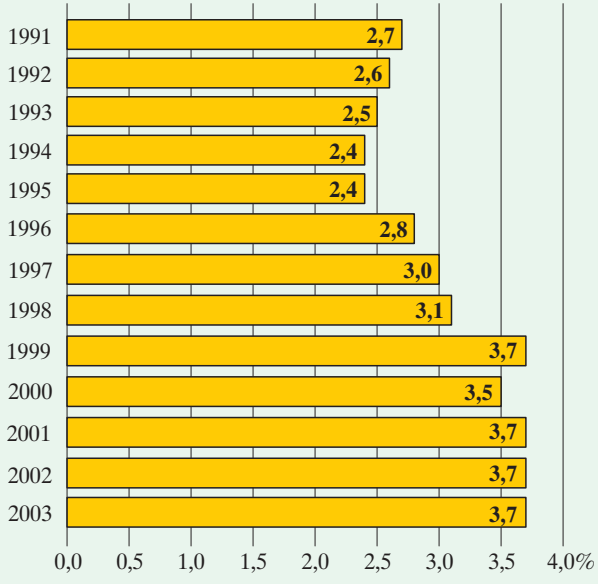
S o u r c e: Poland – data of GUS (National Accounts and Finance Division); EU, OECD – OECD Science, Technology and Industry Scoreboard, Towards a Knowledge-based Economy, Science and Innovation, 2001 Edition, OECD, Paris 2001.

Figure 1.6. INVESTMENT IN KNOWLEDGE AS A % OF GDP (CURRENT PRICES), 1995–2003



S o u r c e: Poland – data of GUS and Ministry of Finance; OECD, EU – OECD Science, Technology and Industry Scoreboard, Towards a Knowledge-based Economy, Science and Innovation, 2001 Edition, OECD, Paris 2001.

Figure 1.7. EXPENDITURE ON TERTIARY EDUCATION AS A % OF THE STATE BUDGET EXPENDITURE, 1991–2003



S o u r c e: data of Ministry of Finance.

Table 1.1. Supplementary information: price indices and currency exchange rates

Specification	1999	2000	2001	2002	2003
GDP price indices (previous year=100,0)	106,3	106,6	104,1	101,3	100,5
Price indices of goods and services (previous year=100,0)	107,4	110,4	105,5	101,8	101,1
Price indices of consumer goods and services (previous year=100,0)	107,3	110,1	105,5	101,9	100,8
Currency exchange rates:					
USD value in PLN (average)	4,15	4,35	4,09	4,08	3,89
Euro value in PLN (average)	4,23	4,01	3,67	3,86	4,40

S o u r c e: Statistical Yearbook of the Republic of Poland.

II R&D ACTIVITY

METHODOLOGICAL NOTE

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to device new applications *(Frascati Manual 2002)*.

1. Research and development activity (R&D) includes:
— **basic research**, *i.e.* experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view;
— **applied research**, *i.e.* also original investigation undertaken in order to acquire new knowledge; it is, however, directed primarily towards a specific practical aim or objective;
— **experimental development**, *i.e.* systematic work, drawing on existing knowledge gained from research and (or) practical experience, that is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed including preparation of prototypes and pilot installations.

2. Information regarding research and development activity includes the following groups of entities performing this activity:
1) **scientific and research-development units** (**NACE Rev. 1, div. 73**, units whose main activity is performing R&D):
   a) scientific units of the Polish Academy of Sciences (scientific institutes and independent research departments);
   b) branch research-development 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); represent various scientific disciplines including basic research in social sciences and humanities; work on the basis of the Law of 25 July 1985 on Branch R&D Units (uniform text — Journal of Laws 2001 No. 33, item 388);
   c) others — mostly private units whose main activity is performing R&D;
2) **science support units** — scientific libraries, scientific archives, scientific societies and other ”auxiliary units”;

3) **business enterprises (development units)** — economic entities, primarily industrial enterprises, with their own R&D facilities (laboratories, design offices, technical development plants, *etc.*), performing R&D activity mainly of experimental development character along with their principal activity;
4) **higher education institutions**;
5) **other units** — primarily hospitals conducting R&D activity along with their principal activity, excluding clinics of medical academies (universities) and clinics and hospitals of the Medical Centre for Postgraduate Education included in the category *higher education institutions* as well as hospitals having the status of research institutes included in the category *branch research-development units.*

3. Employment in R&D activity includes:
1) **researchers (RSE)**, *i.e.* professionals (scientists and engineers) having higher education degrees engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned;
2) **technicians and equivalent staff** are persons whose main task requires technical knowledge and experience in one or more fields of engineering, physical and life sciences, or social sciences and humanities; they participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers;
3) **other supporting staff** includes skilled and unskilled draftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

4. Data regarding employment in R&D activity include exclusively persons employed directly in this activity (or providing direct services for R&D) and spending at least 10 per cent of their normal working time on R&D.

The numbers of persons involved in R&D are expressed in **full-time equivalents (FTE)** and head counts (HC).

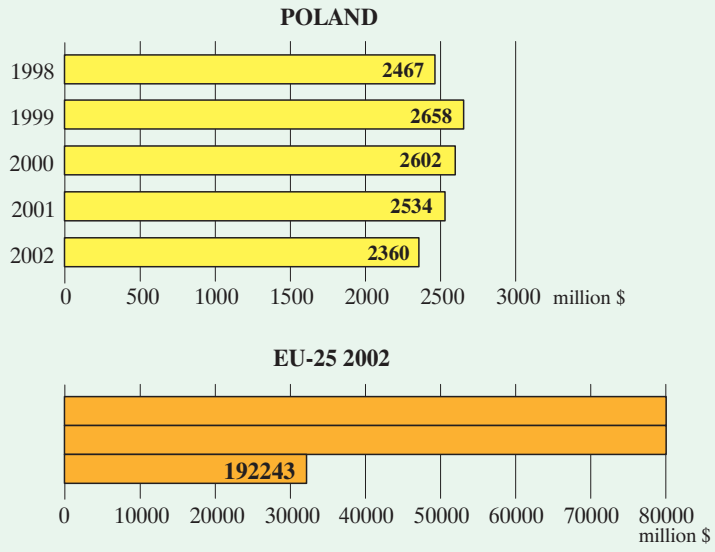
One **FTE** equals one person-year spent on R&D.

5. The source of data presented in this part is the GUS yearly survey on R&D activity.

Table 2.1. Units performing R&D, 1995–2003
As of 31 XII

Specification	1995	2000	2002	2003
T o t a l	**738**	**860**	**838**	**925**
Scientific and research-development units (NACE Rev.1, division 73)	**334**	**321**	**338**	**314**
Scientific units of the Polish Academy of Sciences	81	81	81	80
scientific institutes	54	58	57	58
independent research departments	27	23	24	22
Branch research-development units	218	222	211	201
research institutes	128	137	139	135
central laboratories	10	11	10	8
research-development centres	80	74	62	58
Others	35	18	46	33
Science support units	**4**	**18**	**29**	**31**
Business enterprises	**296**	**402**	**345**	**446**
Higher education institutions	**104**	**114**	**119**	**128**
Other units	**—**	**5**	**7**	**6**

Figure 2.1. GROSS DOMESTIC EXPENDITURE ON R&D (GERD) (million 2000 dollars – constant prices and PPP), 1998–2002



S o u r c e: Main Science and Technology Indicators 2004/2, OECD 2004.

Figure 2.2. BERD BY SOURCE OF FUNDS, %, 1999 AND 2003

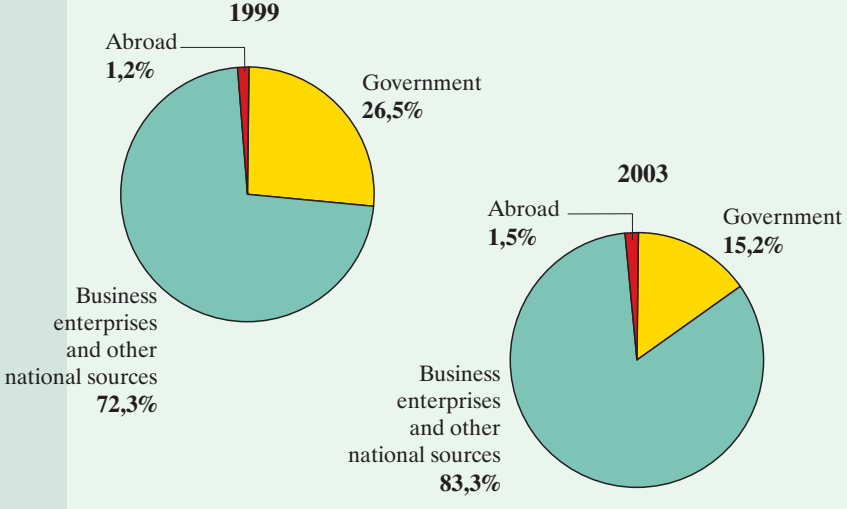


Table 2.2. Gross domestic expenditure[a] on R&D activity (GERD) by type of costs and type of units, million PLN (current prices)

Types of units performing R&D	1995	2000	2002	2003			
	grand total			expenditure			
				current		capital	
				total	of which labour costs	total	of which instruments and equipment
T o t a l	**2132,8**	**4796,1**	**4522,1**	**4558,3**	**3897,1**	**1983,5**	**661,2**	**464,3**
Scientific and research-development units (NACE Rev.1, div. 73)	**1276,1**	**2449,6**	**2283,5**	**2323,9**	**2080,6**	**1131,3**	**243,3**	**163,6**
Scientific units of the Polish Academy of Sciences	265,6	550,1	587,2	638,9	545,2	329,8	93,7	51,9
scientific institutes	213,5	496,2	522,7	579,9	490,2	303,4	89,7	49,9
independent research departments	52,1	53,9	64,5	59,0	55,0	26,4	4,0	2,0
Branch research-development units	962,2	1869,6	1653,5	1644,3	1496,5	777,9	147,8	109,9
research institutes	785,2	1617,5	1511,4	1504,0	1366,2	714,4	137,8	103,1
central laboratories	9,5	24,4	12,0	11,4	10,7	6,5	0,7	0,7
research-development centres	167,5	227,7	130,1	128,9	119,6	57,0	9,3	6,1
Others	48,3	29,9	42,8	40,7	38,9	23,6	1,8	1,8
Science support units	**2,8**	**13,8**	**24,4**	**24,9**	**23,7**	**16,8**	**1,2**	**0,2**
Business enterprises	**292,9**	**791,6**	**658,2**	**739,2**	**590,8**	**300,3**	**148,4**	**122,3**
Higher education institutions	**561,0**	**1512,4**	**1533,8**	**1446,0**	**1178,5**	**521,5**	**267,5**	**177,5**
Other units	**—**	**28,7**	**22,2**	**24,3**	**23,5**	**13,6**	**0,8**	**0,7**

a Excluding depreciation of fixed assets.

Table 2.3. Current expenditure[a] on R&D activity by type of activity and type of units, million PLN (current prices)

Types of units performing R&D		Total	Research		
			basic	applied	experimental development
T o t a l	2000	3981,5	1534,2	991,7	1455,6
	2002	3779,7	1490,7	987,4	1301,6
	2003	**3897,1**	**1510,5**	**1001,4**	**1385,2**
Scientific and research-development units (NACE Rev. 1, division 73)		**2080,6**	**774,8**	**613,8**	**692,0**
Scientific units of the Polish Academy of Sciences		545,2	483,8	45,5	15,9
Branch research-development units		1496,5	287,1	546,5	662,9
Others		38,9	3,9	21,8	13,2
Science support units		**23,7**	**11,7**	**7,2**	**4,8**
Business enterprises		**590,8**	**15,7**	**63,9**	**511,2**
Higher education institutions		**1178,5**	**706,1**	**300,9**	**171,5**
Other units		**23,5**	**2,2**	**15,6**	**5,7**

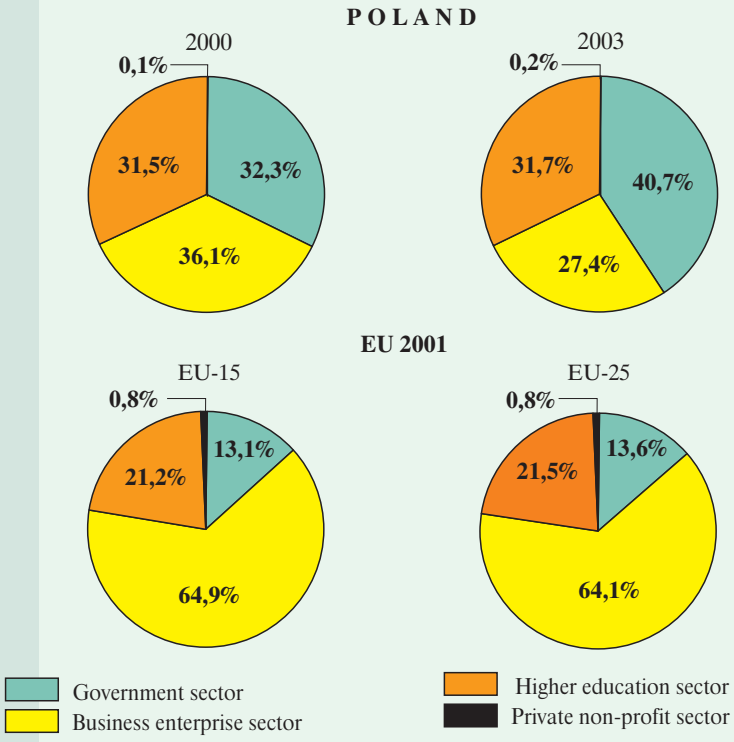
a Excluding depreciation of fixed assets.

Table 2.4. Gross domestic expenditure[a] on R&D activity (GERD) (current prices) by source of funds, %

Sources of funds	1995	2000	2002	2003
T o t a l	**100,0**	**100,0**	**100,0**	**100,0**
of which funds from:				
The State budget	60,2	63,4	61,9	62,7
Business enterprises	24,1	24,5	23,0	23,5
Scientific units of the Polish Academy of Sciences and branch research-development units	11,6	7,7	6,3	5,9
Abroad	1,7	1,8	4,8	4,6

a Excluding depreciation of fixed assets.

Figure 2.3. GERD BY SECTOR OF PERFORMANCE, %, 2000 –2003



S o u r c e: Main Science and Technology Indicators 2003/2 and 2004/2, OECD.

Figure 2.4. GERD BY TYPE OF COSTS, %, 2000 AND 2003

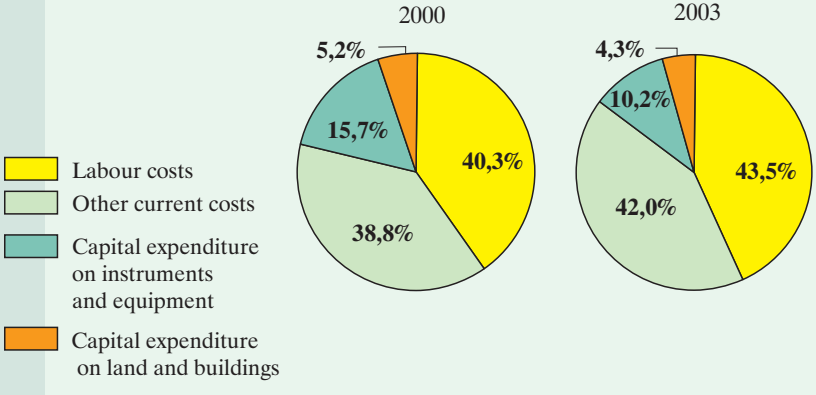


Figure 2.5. CURRENT EXPENDITURE ON R&D BY TYPE OF ACTIVITY, %, 1995–2003

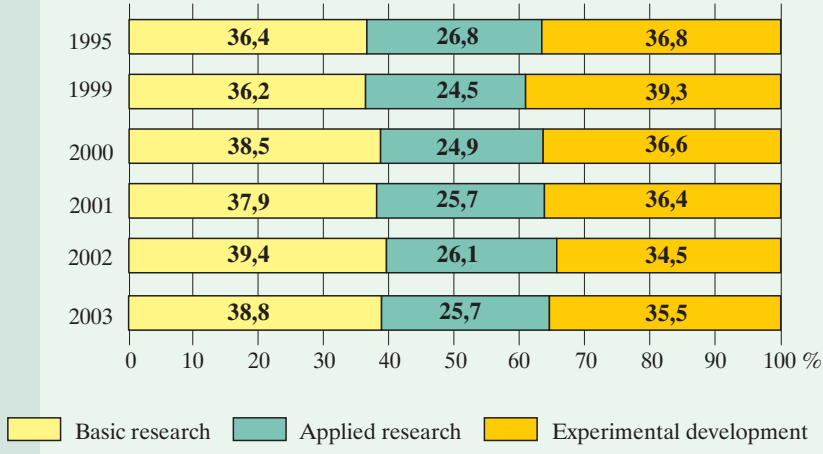


Figure 2.6. GERD BY FIELD OF SCIENCE, %, 2000 AND 2003

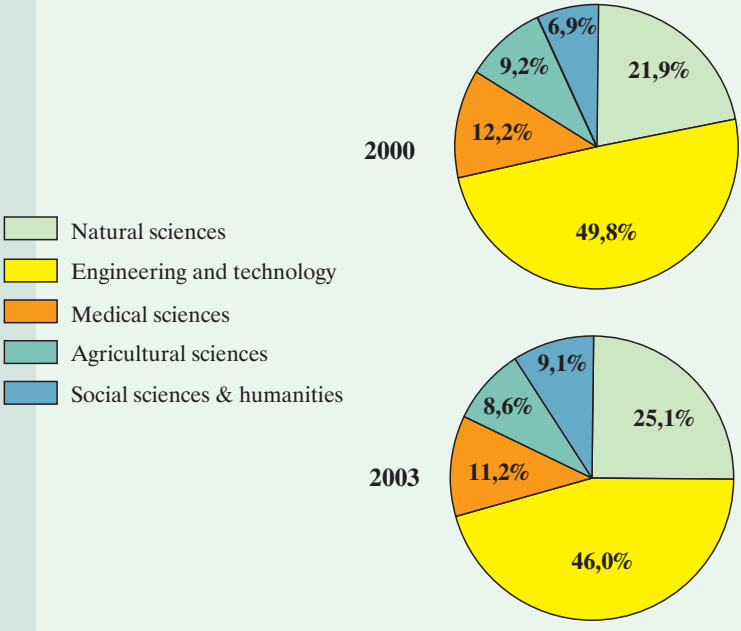


Table 2.5. R&D personnel by occupation and type of units

Types of units performing R&D	1995	2000	2002	2003			
	personnel (FTE)						
	total				researchers	technicians and equivalent staff	other supporting staff
T o t a l	**83590**	**78925**	**76214**	**77040**	**58595**	**10880**	**7565**
Scientific and research-development units (NACE Rev.1, div.73)	**38989**	**30277**	**26716**	**25999**	**16155**	**5398**	**4446**
Scientific units of the Polish Academy of Sciences	8089	7233	6579	6443	4494	886	1063
scientific institutes	6702	6492	5859	5743	4058	773	912
independent research departments	1387	741	720	700	436	113	151
Branch research-development units	29816	22719	19729	19196	11387	4464	3345
research institutes	24244	18930	17440	17118	10240	3957	2921
central laboratories	425	357	277	198	122	50	26
research-development centres	5147	3432	2012	1880	1025	457	398
Others	1084	325	408	360	274	48	38
Science support units	**72**	**130**	**232**	**271**	**196**	**38**	**37**
Business enterprises	**8908**	**6906**	**5324**	**6168**	**3668**	**1910**	**590**
Higher education institutions	**35621**	**41499**	**43752**	**44455**	**38455**	**3520**	**2480**
Other units	**—**	**113**	**190**	**147**	**121**	**14**	**12**

Table 2.6. R&D personnel by educational level and type of units

Head count data — as of 31 XII

Types of units performing R&D		Total	Education				
			tertiary				other (below tertiary)
			with title of professor	with scientific degree of		with other tertiary degrees below the PhD level (Master, licenciate and equivalent)	
				habilitated doctor[a] (HD)	doctor (PhD)		
T o t a l	2000	125614	8362	9778	32798	45461	29215
	2002	122987	8917	9893	35622	45065	23490
	2003	**126241**	**9139**	**10212**	**37390**	**46246**	**23254**
Scientific and research-development units (NACE Rev.1, div. 73)	2000	36236	1650	1265	5616	13132	14573
	2002	32248	1597	1325	5503	11976	11847
	2003	**31561**	**1608**	**1294**	**5556**	**12043**	**11060**
Scientific units of the Polish Academy of Sciences		7340	771	633	1888	2199	1849
scientific institutes		6559	708	588	1695	1976	1592
independent research departments		781	63	45	193	223	257
Branch research-development units		23721	827	645	3604	9570	9075
research institutes		20714	771	609	3379	8277	7678
central laboratories		267	4	3	29	123	108
research-development centres		2740	52	33	196	1170	1289
Others		500	10	16	64	274	136
Science support units		**299**	**7**	**5**	**39**	**186**	**62**
Business enterprises	2000	9443	25	23	193	4948	4254
	2002	7210	6	5	145	4409	2645
	2003	**8455**	**4**	**5**	**166**	**5315**	**2965**
Higher education institutions	2000	79539	6678	8474	26935	27157	10295
	2002	83011	7292	8540	29891	28423	8865
	2003	**85745**	**7510**	**8896**	**31590**	**28607**	**9142**
Other units	2000	191	5	13	23	107	43
	2002	233	14	18	47	83	71
	2003	**181**	**10**	**12**	**39**	**95**	**25**

a The habilitated doctor's degree (HD), which is higher than doctorate (second doctorate), is peculiar to Poland. The degree is awarded on the basis of an appropriate dissertation and is necessary for obtaining the title of professor and a professorial post in scientific institutions.

Figure 2.7. R&D PERSONNEL (FTE) BY OCCUPATION, %, 2000 AND 2003

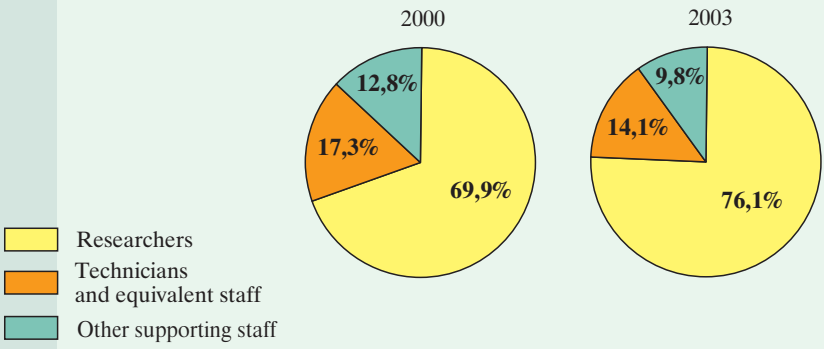


Figure 2.8. R&D PERSONNEL (HC) BY GENDER AND OCCUPATION, %, 1995 AND 2000

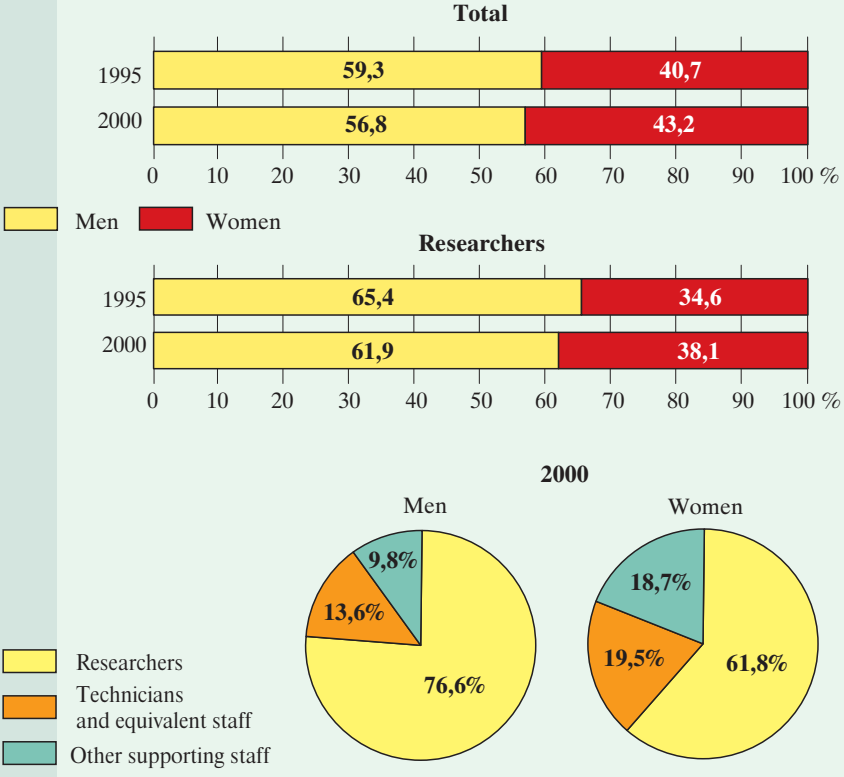


Table 2.7. R&D personnel by occupation and sector of performance

Sectors of performance	2000	2003	2000	2003			
	number of units (as of 31 XII)		personnel				
			total		researchers	technicians and equivalent staff	other supporting staff
	Head count (as of 31 XII)						
T o t a l	**860**	**925**	**125614**	**126241**	**94432**	**16876**	**14933**
Business enterprise	540	548	24107	15035	8452	4049	2534
Government	191	228	21892	25390	14964	5400	5026
Higher education	114	128	79539	85745	70969	7422	7354
Private non-profit	15	21	76	71	47	5	19
	Full-time equivalents						
T o t a l	**x**	**x**	**78925**	**77040**	**58595**	**10881**	**7564**
Business enterprise	x	x	18586	11378	6829	2964	1585
Government	x	x	18823	21100	13233	4384	3483
Higher education	x	x	41499	44455	38455	3520	2480
Private non-profit	x	x	17	107	78	13	16

Table 2.8. R&D personnel and expenditure on R&D activity (GERD) by field of science

Fields of science	2000	2002	2003	2000	2002	2003
	R&D personnel			expenditure[a] in million PLN		
T o t a l	**78925**	**76214**	**77040**	**4796,1**	**4522,1**	**4558,3**
in the field of:						
Natural sciences	17885	17675	17754	1049,6	1203,3	1144,4
Engineering and technology	29254	25577	25276	2390,4	1985,5	2095,3
Medical sciences	10018	9727	10770	586,7	515,4	508,7
Agricultural sciences	8213	6934	6660	439,4	373,0	392,8
Social sciences & humanities	13555	16301	16580	330,0	444,9	417,1

a In current prices; excluding depreciation of fixed assets.

Figure 2.9. R&D PERSONNEL (FTE) BY FIELD OF SCIENCE, %, 2000 AND 2003

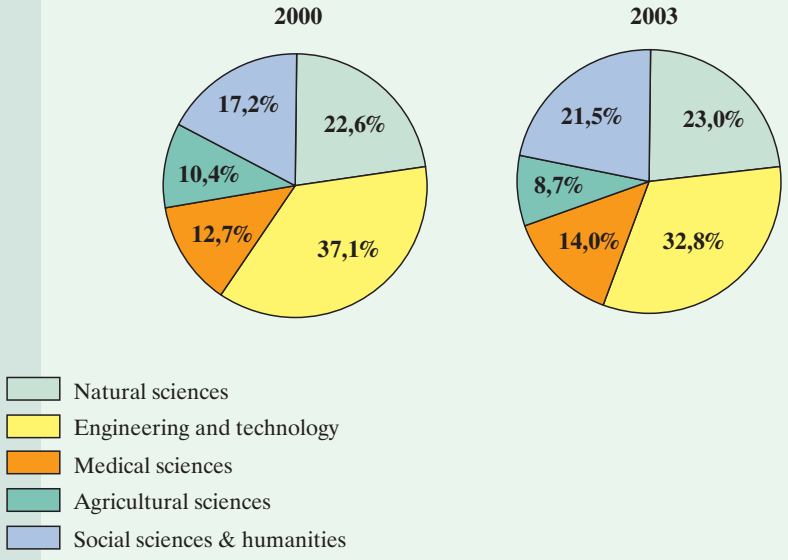


Figure 2.10. RESEARCHERS (FTE) BY FIELD OF SCIENCE, %, 2000 AND 2003

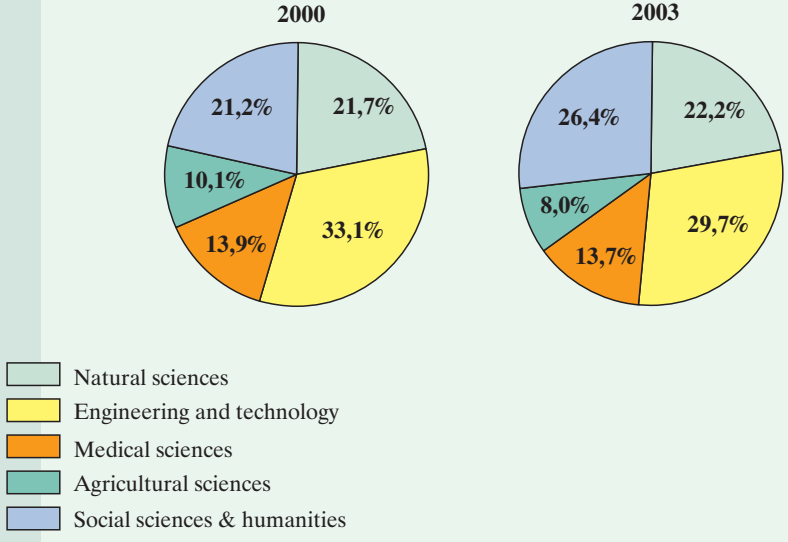
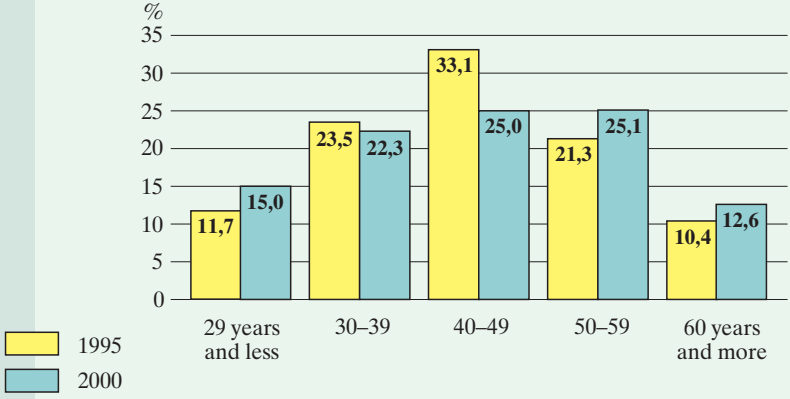
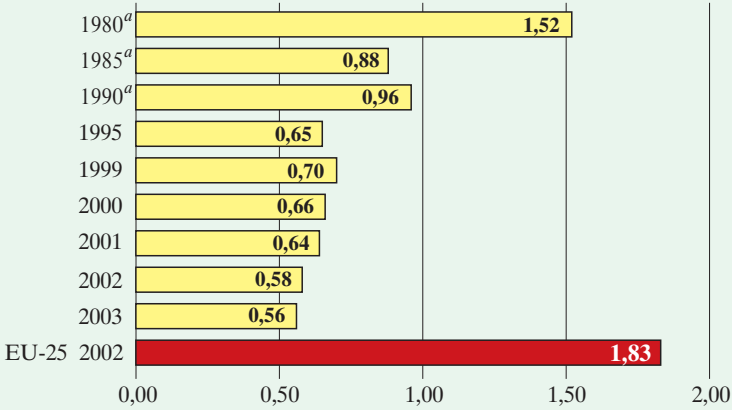


Figure 2.11. R&D PERSONNEL (HC) WITH TERTIARY EDUCATION BY AGE GROUP, %, 1995 AND 2000



2.12. R&D INTENSITY

Figure 2.12.1. GERD/GDP, %, 1980–2003



a Estimates.

Figure 2.12.2. GERD/GDP RATIO BY SECTOR OF PERFORMANCE, %, 2003

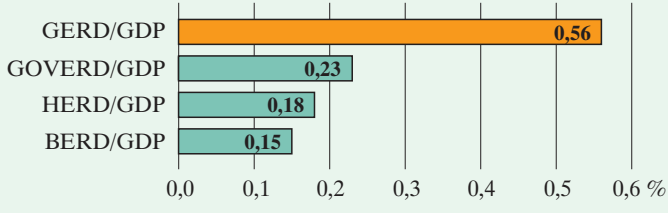


Figure 2.12.3. GERD/GDP RATIO BY REGION (VOIVODSHIP), %, 2002

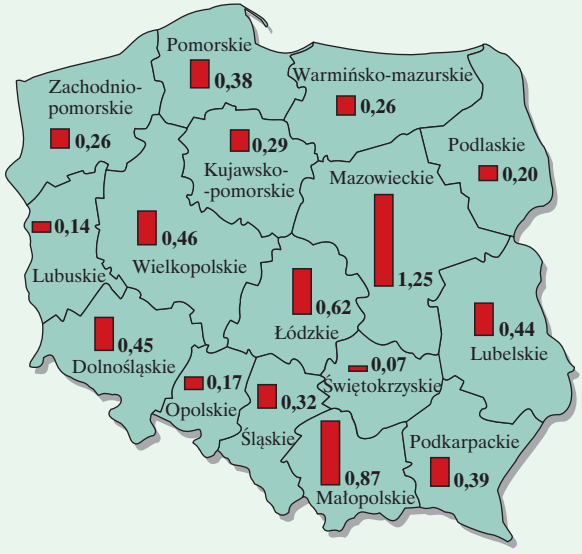


Figure 2.12.4. GERD *PER CAPITA* POPULATION, CURRENT PPP $, 2000–2002

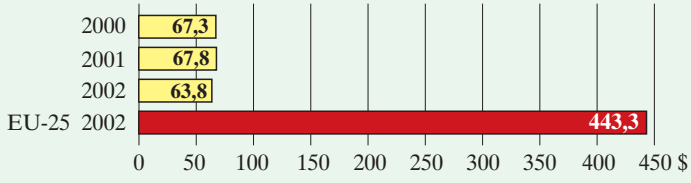


Figure 2.12.5. TOTAL R&D PERSONNEL (FTE) *PER* THOUSAND TOTAL EMPLOYMENT, 2000–2002

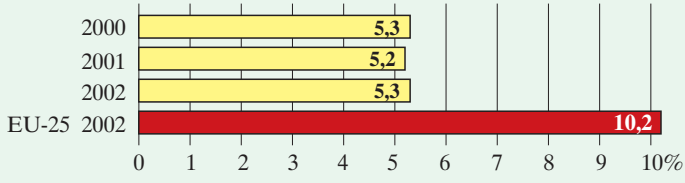
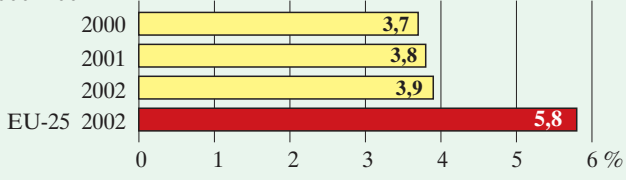
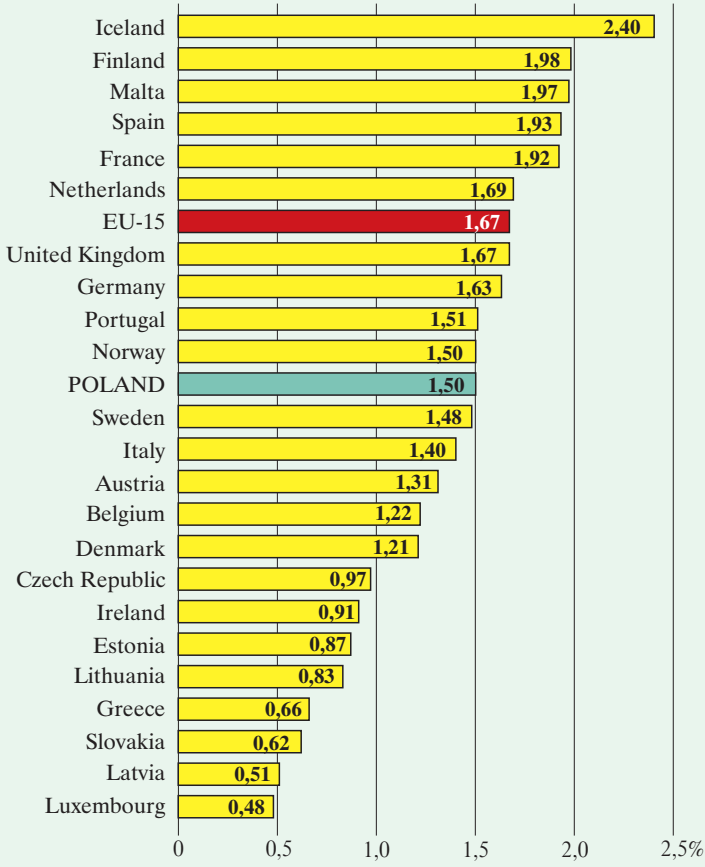


Figure 2.12.6. RESEARCHERS (FTE) *PER* THOUSAND TOTAL EMPLOYMENT, 2000–2002



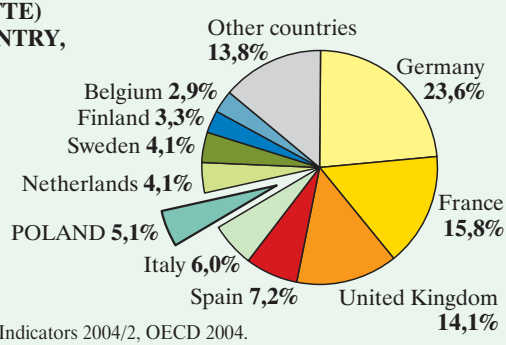
S o u r c e: Main Science and Technology Indicators 2004/2, OECD 2004.

Figure 2.13. GOVERNMENT BUDGET APPROPRIATIONS OR OUTLAYS ON R&D (GBAORD) AS A % OF TOTAL GENERAL GOVERNMENT EXPENDITURE IN SELECTED EUROPEAN COUNTRIES, 2002



S o u r c e: Statistics in Focus, Theme 9-7/2003 and 5/2005, Eurostat; Poland - data of the Ministry of Finance (data for Poland concern the State budget sector "Science").

Figure 2.14. RESEARCHERS (FTE) IN EU-25 BY COUNTRY, %, 2001



S o u r c e: Main Science and Technology Indicators 2004/2, OECD 2004.

III INNOVATION ACTIVITIES

METHODOLOGICAL NOTE

Introduction

In Poland, innovation surveys have a very long and rich tradition going back to the early 1960s. Some elements of innovation surveys such as questions concerning expenditure on new technological processes were included in special surveys and studies made since early 1960s.

Recently, there can be observed in Poland a tremendous rise in interest in the innovation problems. This high interest is connected — among others — to the process of establishing the National System of Innovation (NSI, of which Regional Innovation Strategies, RIS) which takes currently place in Poland, and in which there are involved many official agencies and advisory bodies, and also individual scientists and other specialists.

In the Polish society, especially in many different professional circles, there is also systematically increasing the awareness of the role of innovation in modern economic development. The chances are that this interest in the innovation problems and recognition of its role and importance will be still growing more intense in the forthcoming future.

The main source of data on innovation in Poland is the Central Statistical Office of Poland which is currently in the process of implementing a new conceptual framework for innovation surveys system based on the new EU legislation on S&T statistics (*Decision No 1608/2003/EC of the European Parliament and of the Council of 22 July 2003 concerning the production and development of Community statistics on science and technology*).

Short overview of the Polish innovation surveys system

Currently, the innovation monitoring system in Poland consists of two following parts:

1) **Concise, yearly, census survey on innovation in industry** (*Mining and quarrying* — NACE 10–14, *Manufacturing* — NACE 15–37 and *Electricity, gas and water supply* — NACE 40–41) in enterprises with more than 49 employees, covering selected basic variables of innovation activities such as:
   — expenditure on innovation (by type of innovation activities and source of funds),
   — domestic and exports sales of innovative products (turnover due to innovative products),

— transfer of technology,
— co-operation in innovation and
— some other related issues (AMT, implementation of quality assurance standards or advanced management techniques, *e.g.* TQM, *etc.*).

The regular census survey on innovation activities in industry, which was launched by GUS at the beginning of the 1980s, has evolved over time, responding to changing user needs.

2) **Comprehensive, periodic, CIS-type[a] surveys on innovation in industry and in marketed service sector** in enterprises with more than 9 employees, carried out every four years and covering — apart from the above mentioned — also other questions concerning different important aspects of innovation activities such as:
— implementation of new products (goods and services) and processes,
— sources of information for innovation,
— objectives of innovation,
— effects of innovation,
— obstacles to innovation,
— methods of innovation protection,
— non-technological innovations, *etc.*

Every four years the annual survey on innovation in industry is merged into the comprehensive CIS-type survey.

Till now, there have been carried out five comprehensive surveys on innovation:

- **1993 survey on innovation in industry** — based, first of all, on the national methodology,
- **1997 survey on innovation in industry** — for 1994–1996 as a reference period, based on the CIS-1 questionnaire and methodological recommendations,
- **2000 survey on innovation in the service sector** (wholesale trade and commission trade, except for motor vehicles and motorcycles — NACE 51 except 51.1: wholesale on a fee or contract basis; transport — NACE 60–62; post and telecommunications — NACE 64; financial intermediation — NACE 65–67; computer and related activities — NACE 72; architectural and engineering activities and related technical consultancy — NACE 74.2) — for 1997–1999 as a reference period, based on the CIS-2 questionnaire and methodological recommendations,
- **2001 survey on innovation in industry** — for 1998–2000 as a reference period, based on the CIS-2 questionnaire and methodological recommendations,
- **2004 survey on innovation in the service sector** (wholesale trade and commission trade, except for motor vehicles and motorcycles — NACE 51;

a Community Innovation Survey (abbr. CIS) — periodic survey on innovation carried out every four years in the EU and EFTA countries under the auspices of Eurostat.

transport, storage and communication — NACE 60–64; financial intermediation — NACE 65–67; computer and related activities — NACE 72; research and development — NACE 73; architectural and engineering activities and related technical consultancy — NACE 74.2, technical testing and analysis — NACE 74.3) — for 2001–2003 as a reference period, based on the CIS-3 questionnaire and methodological recommendations.

Basic definitions

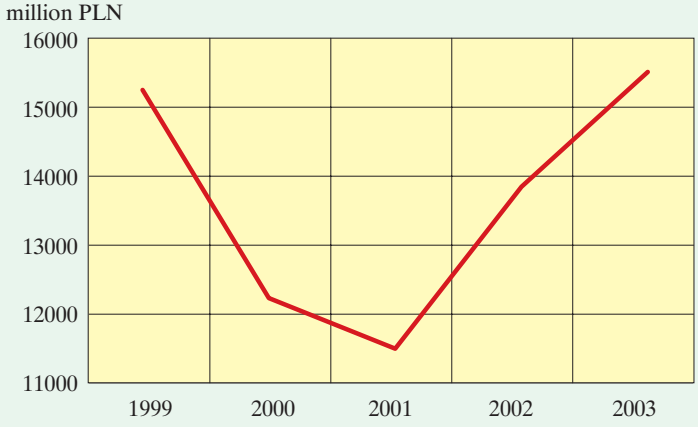
1. Innovation activities are all those scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of technologically new or improved products or processes. Some may be innovative in their own right, others are not novel but are necessary for implemention (*Oslo Manual, OECD/Eurostat 1997*).

2. Innovating enterprise is an enterprise that has implemented technological innovations in the surveyed three-year period. Technological innovations are products (goods), services and processes, including methods of product delivery, which are technologically new (or significantly improved) to the surveyed enterprise but do not necessarily have to be new to the enterprise's market.

3. Expenditure on innovation includes expenditure on:

— R&D activity (intramural and extramural),
— acquisition of disembodied technology and know-how (patents, non-patented inventions, licences, disclosures of know-how, *etc.*),
— acquisition of fixed assets required for the innovations introduction (capital expenditure on land and buildings and instruments and equipment),
— other preparations for the implementation of technological innovations,
— training directly linked to technological innovations and
— marketing for technologically new and improved products.

Figure 3.1. EXPENDITURE ON INNOVATION ACTIVITIES IN INDUSTRIAL ENTERPRISES[a] IN 1999-2003 (CURRENT PRICES)



a Data concern enterprises with more than 49 employees in *Mining and quarrying* (NACE 10-14), *Manufacturing* (NACE 15-37) and *Electricity, gas and water supply* (NACE 40-41).

S o u r c e: GUS surveys on innovation in industry.

Table 3.1. Number of innovating enterprises in industry by size-class and economic activity (NACE Rev. 1), %, 1998–2000

Economic activity	Enterprises with more than 9 employees				
	grand total	of which enterprises with			
		10–49 employees	50 or more employees		
			total	50–249	250 or more
	enterprises which introduced new or improved products or processes during the period 1998–2000 as a % of total number of enterprises				
T o t a l	**·**	**.**	**33,1**	**25,7**	**56,5**
Mining and quarrying (NACE 10–14)	·	·	31,6	25,8	40,7
Manufacturing (NACE 15–37)	17,1	10,7	33,7	26,2	58,3
Electricity, gas and water supply (NACE 40–41)	·	·	25,1	17,3	43,7

S o u r c e: GUS 2001 CIS-type (comprehensive) survey on innovation in industry (based on the CIS-2 questionnaire).

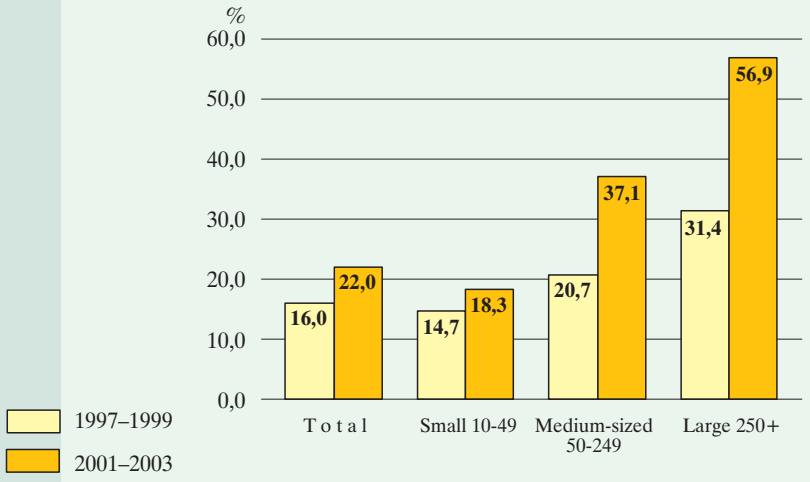
Table 3.2. Number of innovating enterprises in the service sector[a] by economic activity (NACE Rev. 1), %, 1997–1999 and 2001–2003

Economic activity	Enterprises which introduced new or improved products or processes during the period	
	1997–1999	2001–2003
T o t a l	**16,0**	**22,0**
public sector	20,2	39,5
private sector	15,8	21,0
Wholesale trade and commission trade, except for motor vehicles and motorcycles (NACE 51[b])	14,2	19,8
Land transport, transport via pipelines (NACE 60)	15,3	9,4
Water transport (NACE 61)	32,3	11,4
Air transport (NACE 62)	—	35,0
Supporting and auxiliary transport activities; activities of travel agencies (NACE 63)	.	19,7
Post and telecommunications (NACE 64)	23,4	37,7
Financial intermediation, except insurance and pension funding (NACE 65)	23,0	45,8
Insurance and pension funding, except compulsory social security (NACE 66)	19,0	69,3
Activities auxiliary to financial intermediation (NACE 67)	9,0	20,2
Computer and related activities (NACE 72)	23,6	35,4
Research and development (NACE 73)	.	74,9
Architectural and engineering activities and related technical consultancy (NACE 74.2)	23,1	16,5
Technical testing and analysis (NACE 74.3)	.	27,5

a Data concern enterprises with more than 9 employees. *b* For 1997–1999 period — NACE 51 division except 51.1 (wholesale on a fee or contract basis).

S o u r c e: GUS 2000 survey on innovation in the service sector (based on the CIS-2 questionnaire) and GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

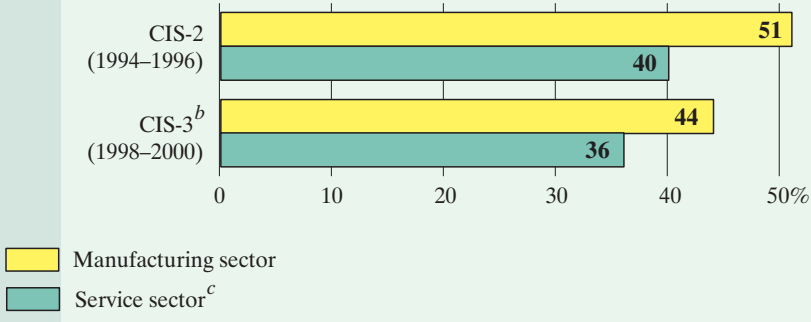
Figure 3.2. NUMBER OF INNOVATING ENTERPRISES IN THE SERVICE SECTOR[a] BY SIZE-CLASS, %, 1997–1999 AND 2001–2003



a For information on the target populations, see methodological note and table 3.2.

Source: GUS 2000 survey on innovation in the service sector (based on the CIS-2 questionnaire) and GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

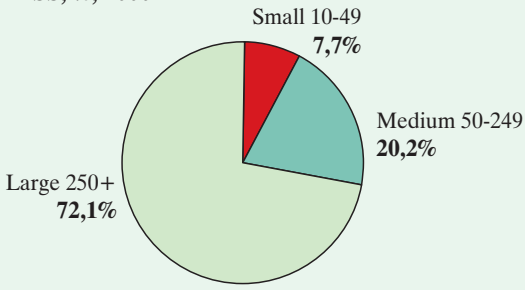
Figure 3.3. NUMBER OF INNOVATING ENTERPRISES[a] (PRODUCT AND PROCESS INNOVATORS) IN MANUFACTURING AND SERVICE SECTORS, EU-15 (CIS-2 AND CIS-3), %



a Data concern enterprises with more than 9 employees. In CIS-2 in manufacturing - more than 19 employees.
b Excluding United Kingdom, Ireland and Luxembourg. *c* Target populations: (1) CIS-2 – NACE Rev. 1: 51 except 51.1, 60-62, 64.2, 65-67, 72, 74.2; (2) CIS-3 – NACE Rev. 1: 51, sections I and J, 72, 73, 74.2, 74.3.

Source: CIS-2 - Panorama of the European Union, Statistics on Innovation in Europe, Data 1996-1997, 2000 Edition; CIS-3 - Panorama of the European Union, Innovation in Europe, Results for the EU, Iceland and Norway, Data 1998-2001, 2004 Edition.

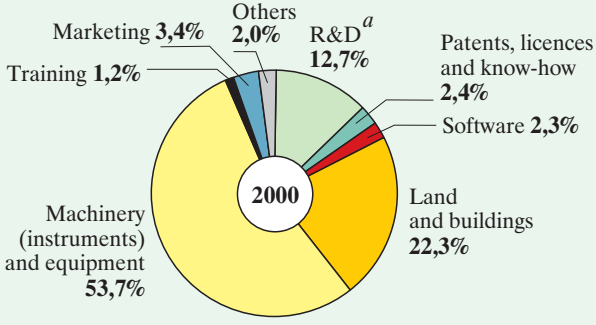
Figure 3.4. EXPENDITURE ON INNOVATION ACTIVITIES IN MANUFACTURING SECTOR BY SIZE-CLASS, %, 2000



S o u r c e: GUS 2001 CIS-type survey on innovation in industry.

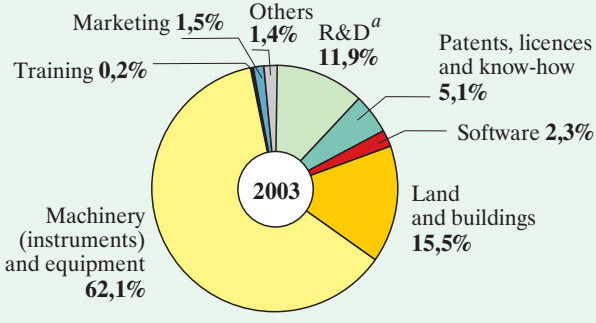
Figure 3.5. EXPENDITURE ON INNOVATION ACTIVITIES IN MANUFACTURING SECTOR BY TYPE OF INNOVATION ACTIVITIES, %, 2000 AND 2003

Enterprises with more than 9 employees



S o u r c e: GUS 2001 CIS-type survey on innovation in industry.

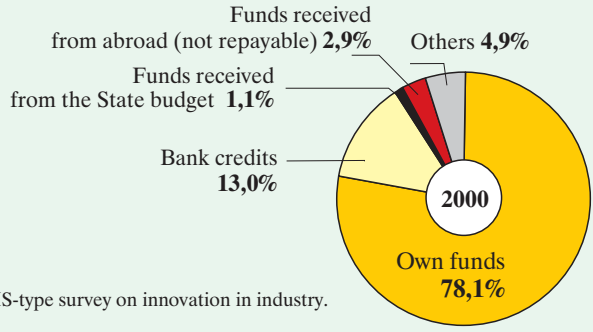
Enterprises with more than 49 employees



a Intramural and extramural expenditure on R&D.
S o u r c e: GUS 2004 yearly survey on innovation in industry.

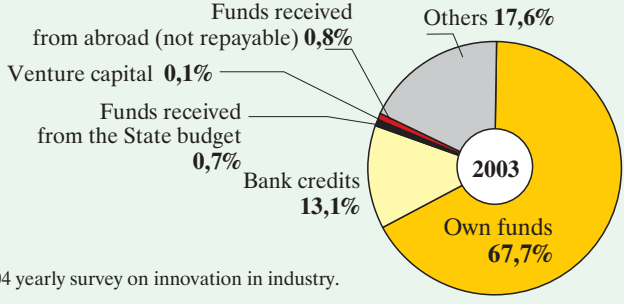
Figure 3.6. EXPENDITURE ON INNOVATION ACTIVITIES IN MANUFACTURING SECTOR BY SOURCE OF FUNDS, %, 2000 AND 2003

Enterprises with more than 9 employees



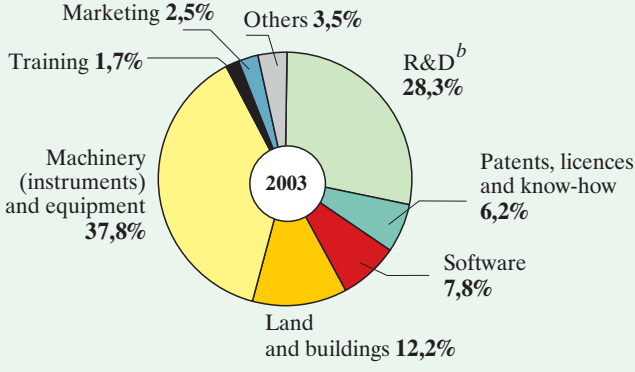
S o u r c e: GUS 2001 CIS-type survey on innovation in industry.

Enterprises with more than 49 employees



S o u r c e: GUS 2004 yearly survey on innovation in industry.

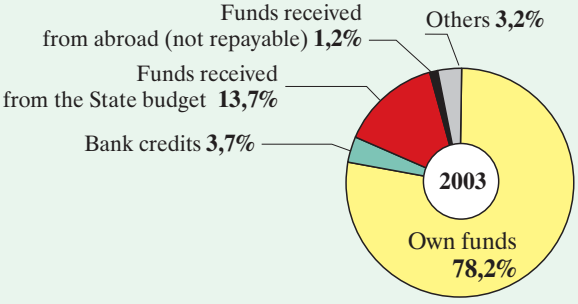
Figure 3.7. EXPENDITURE ON INNOVATION ACTIVITIES IN THE SERVICE SECTOR[a] BY TYPE OF INNOVATION ACTIVITIES, %, 2003



a Data concern enterprises with more than 9 employees; for information on the target population, see methodological note and table 3.2. *b* Intramural and extramural expenditure on R&D.

S o u r c e: GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

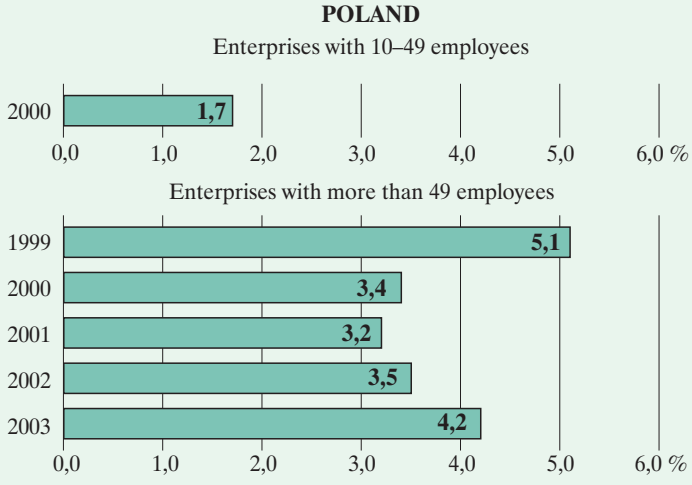
Figure 3.8. EXPENDITURE ON INNOVATION ACTIVITIES IN THE SERVICE SECTOR[a] BY SOURCE OF FUNDS, %, 2003



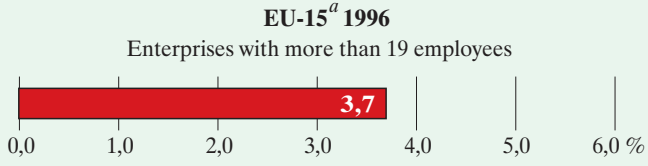
a Data concern enterprises with more than 9 employees; for information on the target population, see methodological note and table 3.2.

S o u r c e: GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

Figure 3.9. EXPENDITURE ON INNOVATION ACTIVITIES IN MANUFACTURING SECTOR AS A % OF TOTAL TURNOVER (INNOVATION INTENSITY), TOTAL POPULATION OF ENTERPRISES, 1999–2003



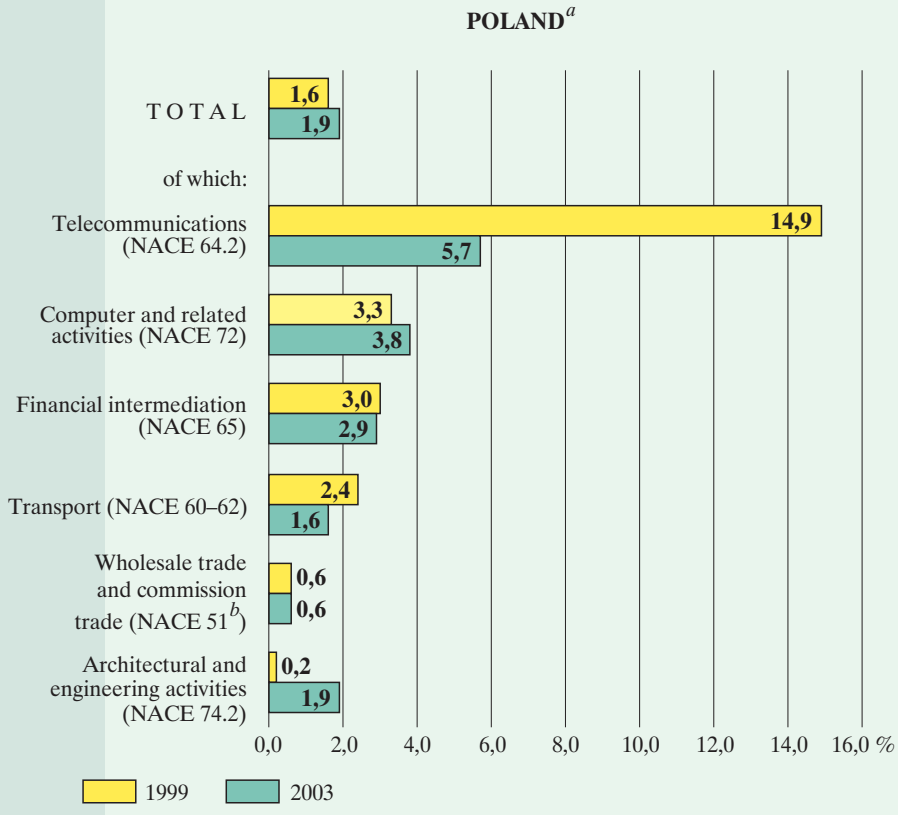
S o u r c e: GUS surveys on innovation in industry.



a Expenditure on land and buildings is not included as a component of expenditure on innovation activities.

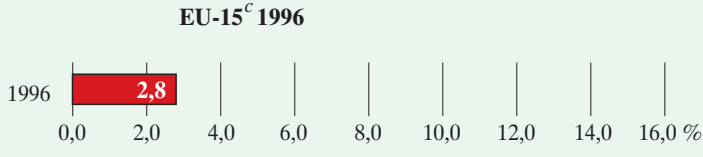
S o u r c e: CIS-2, Eurostat/Enterprise DG.

Figure 3.10. EXPENDITURE ON INNOVATION ACTIVITIES IN THE SERVICE SECTOR[a] AS A %, OF TOTAL TURNOVER (INNOVATION INTENSITY), TOTAL POPULATION OF ENTERPRISES, 1999 AND 2003



a Data concern enterprises with more than 9 employees; for information on the target populations, see methodological note and table 3.2. *b* For 1999 - NACE 51 division except 51.1.

S o u r c e: GUS 2000 survey on innovation in the service sector (based on the CIS-2 questionnaire) and GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

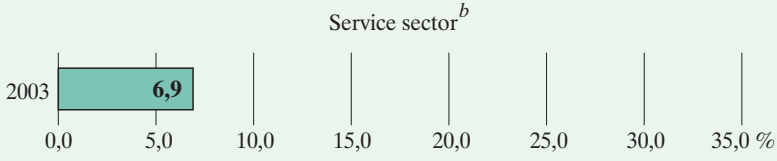


c Expediture on land and buildings is not included as a component of expenditure on innovation activities.
S o u r c e: CIS-2, Eurostat/Enterprise DG.

Figure 3.11. TURNOVER DUE TO INNOVATIVE PRODUCTS (NEW AND IMPROVED PRODUCTS INTRODUCED ON THE MARKET DURING THE LAST THREE-YEAR PERIOD) AS A % OF TOTAL TURNOVER, TOTAL POPULATION OF ENTERPRISES, 1996–2003

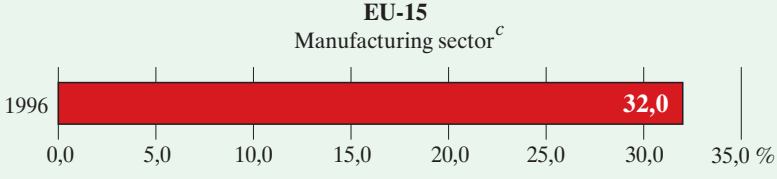
a Data concern enterprises with more than 49 employees.

S o u r c e: GUS surveys on innovation in industry.



b Data concern enterprises with more than 9 employees; for information on the target population, see methodological note and table 3.2.

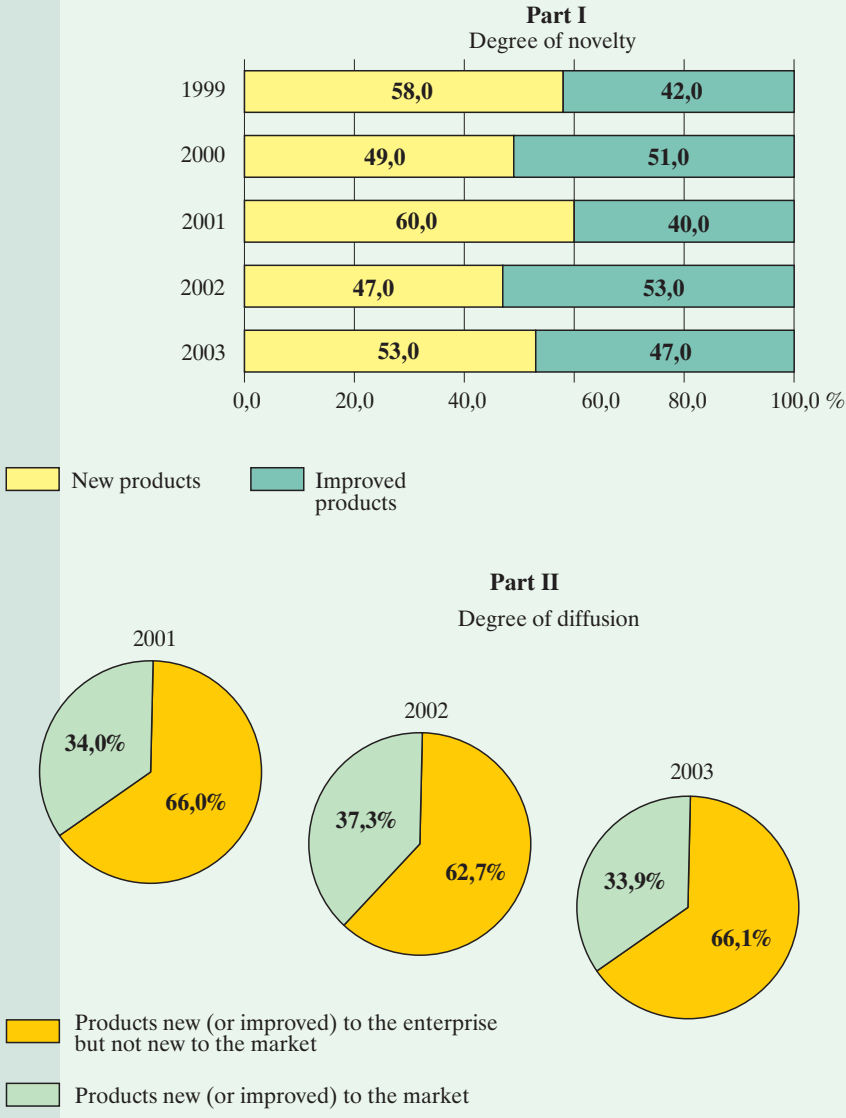
S o u r c e: GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).



c Data concern enterprises with more than 19 employees.

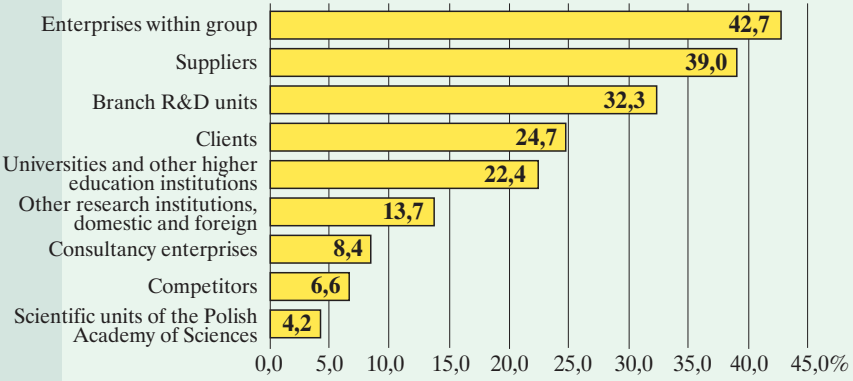
S o u r c e: CIS-2, Eurostat/Enterprise DG.

Figure 3.12. TURNOVER DUE TO INNOVATIVE PRODUCTS (NEW AND IMPROVED PRODUCTS INTRODUCED ON THE MARKET DURING THE LAST THREE-YEAR PERIOD) IN MANUFACTURING SECTOR[a] BY DEGREE OF NOVELTY AND DEGREE OF DIFFUSION, 1999–2003



a Data concern enterprises with more than 49 employees.
S o u r c e: GUS surveys on innovation in industry.

Figure 3.13. NUMBER OF ENTERPRISES WITH ESTABLISHED CO-OPERATION ARRANGEMENTS ON INNOVATION ACTIVITIES[a] BY TYPE OF PARTNER ORGANISATIONS AS A % OF INNOVATING ENTERPRISES WITH INNOVATION CO-OPERATION IN 1998–2000, MANUFACTURING SECTOR[b]



a Innovation co-operation means active participation in joint R&D and other innovation projects with other organisations (either other enterprises or non-commercial institutions). It does not necessarily imply that partners derive immediate commercial benefit from the venture. Pure contracting out work, where there is no active collaboration, is not regarded as innovation co-operation.
b Data concern enterprises with more than 9 employees.
S o u r c e: GUS 2001 CIS-type survey on innovation in industry (based on the CIS-2 questionnaire).

Table 3.3. Industrial enterprises[a] with established co-operation arrangements on innovation activities during 2001–2003 by economic activity (NACE Rev. 1)

Economic activity	Enterprises with innovation co-operation as a % of total number of enterprises
T o t a l	**10,5**
Mining and quarrying (NACE 10–14)	**10,7**
Manufacturing (NACE 15–37)	**10,5**
of which:	
Manufacture of coke, refined petroleum products and nuclear fuel	43,5
Manufacture of basic metals	29,1
Manufacture of chemicals and chemical products	26,9
Manufacture of medical, precision and optical instruments, watches and clocks	22,0
Manufacture of motor vehicles, trailers and semi-trailers	21,5
Manufacture of other transport equipment	20,2
Electricity, gas and water supply (NACE 40–41)	**10,8**

a Data concern enterprises with more than 49 employees.
S o u r c e: GUS 2004 yearly survey on innovation in industry.

Table 3.4. Industrial enterprises[a] with established co-operation arrangements on innovation activities during 2001–2003 by type and location of co-operation partners, %

Partners' location	Enterprises having co-operation arrangements on innovation activities in 2001–2003	Type of partners								
		other enterprises within enterprise group	competitors and other firms from the same industry	clients or customers	consultants	suppliers of equipment, materials, components or software	higher education institutions (domestic and foreign)	scientific units of the Polish Academy Sciences	branch research-development units	other scientific (research) units — domestic and foreign
	in % of total number of enterprises									
T o t a l	**10,54**	**3,43**	**0,76**	**1,53**	**1,44**	**4,41**	**2,81**	**0,51**	**3,44**	**1,20**
Poland	8,52	1,55	0,56	1,10	1,25	3,36	2,80	0,51	3,44	1,00
Abroad	4,34	2,20	0,35	0,79	0,31	2,16	0,10	x	x	0,28
EU and EFTA[b] countries	3,71	1,98	0,28	0,60	0,25	1,88	0,08	x	x	0,14
EU-CC countries[c]	0,71	0,28	0,05	0,20	0,03	0,33	0,01	x	x	0,06
United States	0,58	0,10	0,04	0,15	0,04	0,29	—	x	x	0,03
Japan	0,09	0,01	—	0,03	—	0,05	—	x	x	—
Other countries	0,45	0,15	0,04	0,15	—	0,09	0,03	x	x	0,08

a Data concern enterprises with more than 49 employees in *Mining and quarrying* (NACE 10–14), *Manufacturing* (NACE 15–37) and *Electricity, gas and water supply* (NACE 40–41). *b* European Free Trade Association (EFTA): Iceland, Liechtenstein, Norway, Switzerland. *c* EU Candidate Countries: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Romania, Slovakia, Slovenia and Turkey.

S o u r c e: GUS 2004 yearly survey on innovation in industry.

Table 3.5. Enterprises[a] with established co-operation arrangements on innovation activities during 2001–2003 by economic activity (NACE Rev. 1), service sector

Economic activity	Enterprises with innovation co-operation as a % of total number of enterprises
T o t a l	**9,4**
public sector	26,3
private sector	8,4
Wholesale trade and commission trade, except for motor vehicles and motorcycles (NACE 51)	6,2
Land transport, transport via pipelines (NACE 60)	3,9
Water transport (NACE 61)	5,7
Air transport (NACE 62)	10,0
Supporting and auxiliary transport activities; activities of travel agencies (NACE 63)	10,9
Post and telecommunications (NACE 64)	17,5
Financial intermediation, except insurance and pension funding (NACE 65)	28,6
Insurance and pension funding, except compulsory social security (NACE 66)	43,2
Activities auxiliary to financial intermediation (NACE 67)	12,1
Computer and related activities (NACE 72)	18,1
Research and development (NACE 73)	60,5
Architectural and engineering activities and related technical consultancy (NACE 74.2)	7,1
Technical testing and analysis (NACE 74.3)	16,7

a Data concern enterprises with more than 9 employees.

S o u r c e: GUS 2004 survey on innovation in the service sector (based on the CIS-3 questionnaire).

Table 3.6. Industrial enterprises[a] which introduced non-technological innovations (important strategical and organisational changes) in 1999–2001 by economic activity (NACE Rev. 1)

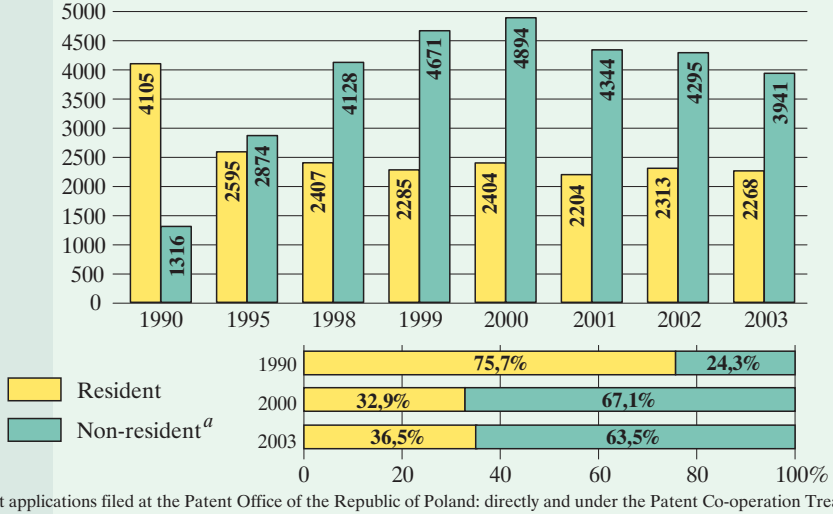
Economic activity	Enterprises which introduced at least one non-technological innovation in 1999–2001	Enterprises which introduced: new or significantly changed corporate strategies	advanced management techniques (*e.g.* TQM)	new or significantly changed organisational structures	significant change of marketing concepts/strategies	significant changes in the aesthetic appearance or design or other subjective changes in at least one of products
	in % of total number of enterprises					
T o t a l	**27,5**	**9,9**	**7,4**	**12,7**	**10,2**	**16,7**
public sector	32,7	12,9	7,6	20,5	13,4	15,0
private sector	26,5	9,4	7,4	11,2	9,6	17,0
Mining and quarrying (NACE 10–14)	**21,5**	**5,4**	**6,0**	**10,1**	**6,0**	**2,0**
Manufacturing (NACE 15–37)	**28,4**	**10,2**	**7,6**	**12,8**	**10,6**	**18,1**
of which:						
Manufacture of coke, refined petroleum products and nuclear fuel	47,4	36,8	15,8	36,8	21,1	10,5
Manufacture of chemicals and chemical products	51,2	19,4	15,9	24,7	19,8	37,5
Manufacture of basic metals	40,2	21,3	15,9	28,0	14,0	11,6
Manufacture of electrical machinery and apparatus n.e.c.	43,7	14,7	19,7	22,2	16,5	24,0
Manufacture of medical, precision and optical instruments, watches and clocks	45,5	16,4	18,7	24,6	17,2	28,4
Manufacture of motor vehicles, trailers and semi-trailers	43,4	17,3	21,2	21,7	13,3	19,9
Electricity, gas and water supply (NACE 40–41)	**17,4**	**7,8**	**5,7**	**12,0**	**6,4**	**1,6**

a Data concern enterprises with more than 49 employees.

S o u r c e: GUS 2002 yearly survey on innovation in industry.

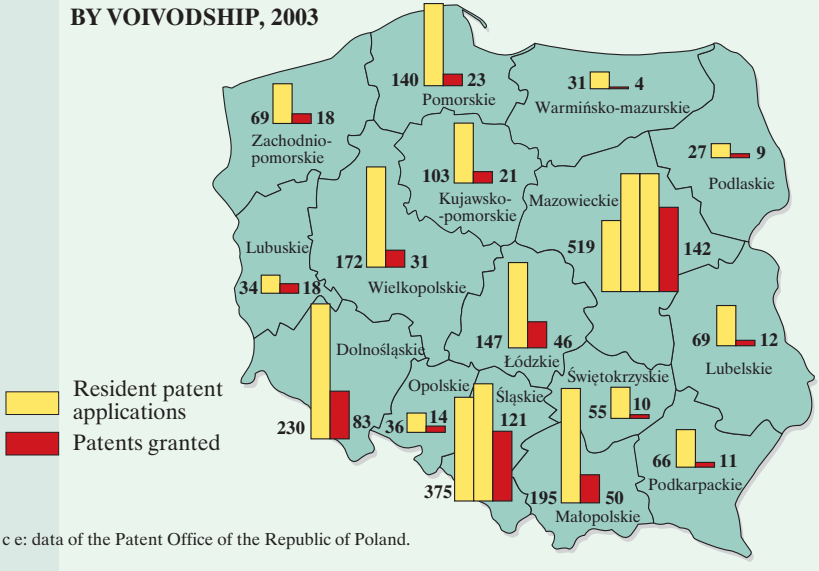
IV PATENTS

Figure 4.1. PATENT APPLICATIONS, 1990–2003



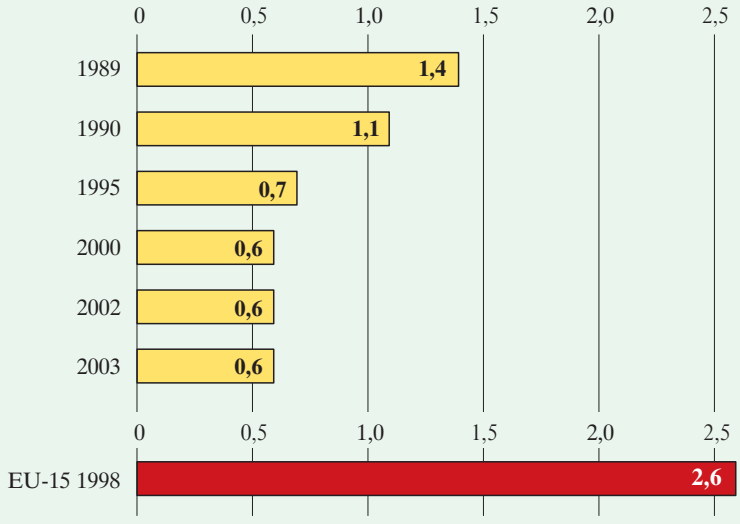
a Patent applications filed at the Patent Office of the Republic of Poland: directly and under the Patent Co-operation Treaty.
S o u r c e: data of the Patent Office of the Republic of Poland.

Figure 4.2. RESIDENT PATENT APPLICATIONS AND PATENTS GRANTED BY VOIVODSHIP, 2003



S o u r c e: data of the Patent Office of the Republic of Poland.

Figure 4.3. INVENTIVENESS COEFFICIENT (RESIDENT PATENT APPLICATIONS PER 10 THOUS. POPULATION), 1989–2003



S o u r c e: data of the Patent Office of the Republic of Poland.

Table 4.1. Patent applications filed abroad by residents of Poland (external patent applications), 1990–2002

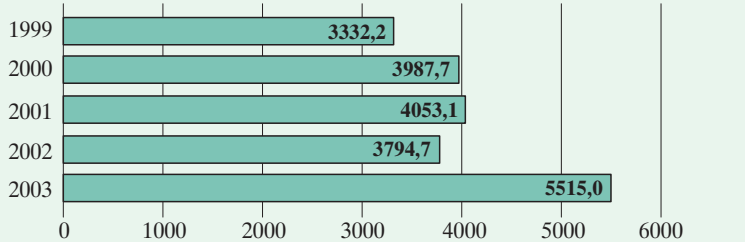
Specification	1990	1995	2000	2001	2002
T o t a l	**154**	**903**	**6327**	**6969**	**9039**
of which:					
European Patent Office (EPO)	7	92	102	102	104
United States Patent and Trademark Office (USPTO)	13	36	100	111	123
Japanese Patent Office (JPO)	4	15	60	65	79

N o t e. External patent applications concern inventions already covered by resident applications; one resident patent application can give rise to several external patent applications.

S o u r c e: data of the World Intellectual Property Organization (WIPO).

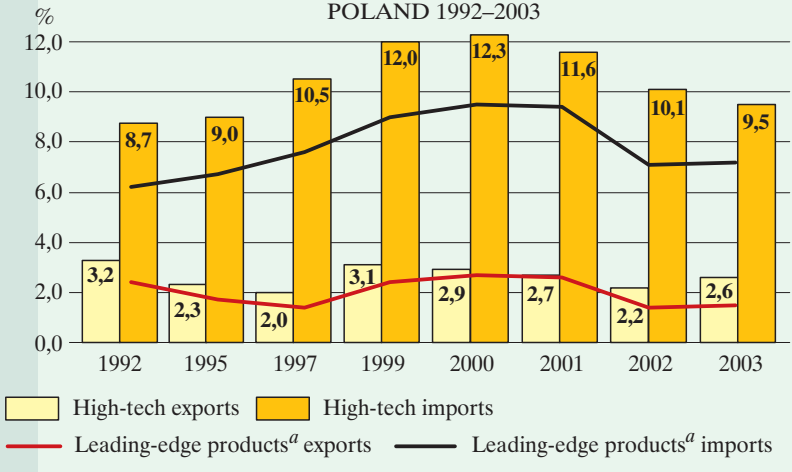
V HIGH TECHNOLOGY AND KNOWLEDGE INTENSIVE SERVICES (HT&KIS)

Figure 5.1. EXPORTS OF HIGH-TECH PRODUCTS[a] (current prices), 1999–2003

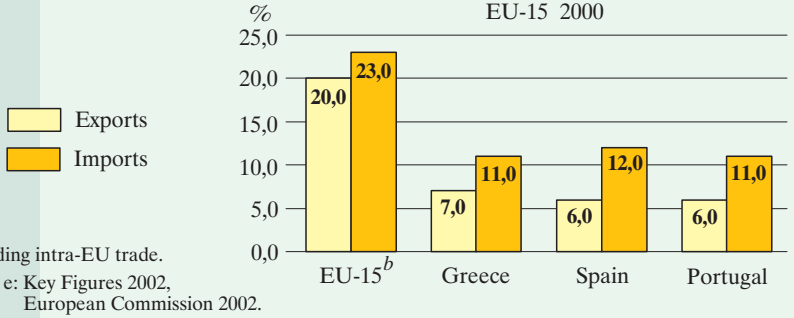


a See Annex I.

Figure 5.2. HIGH-TECH PRODUCTS AS A % OF TOTAL EXPORTS AND IMPORTS, 1992–2003



a The highest category of R&D intensity. See Annex I.



b Excluding intra-EU trade.

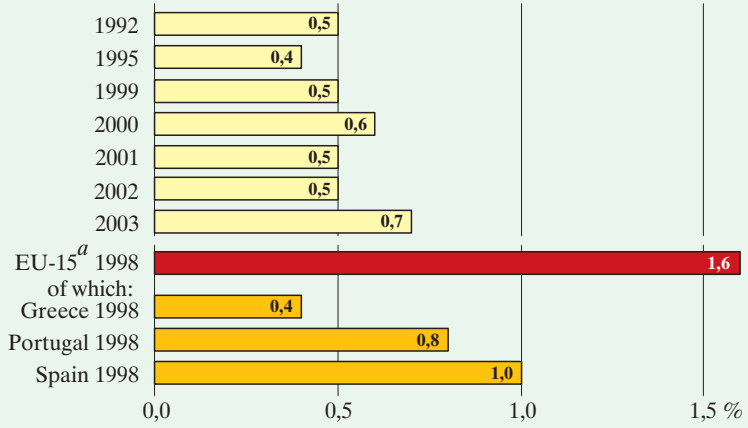
S o u r c e: Key Figures 2002, European Commission 2002.

Table 5.1. High-tech trade by product group[a], %, 1992–2003

Product groups	1992	1995	1999	2001	2002	2003
Exports						
T o t a l high-tech	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Aerospace	9,6	8,9	16,7	22,1	14,2	9,1
Computers & office machinery	3,6	5,4	9,6	8,9	10,0	4,6
Electronics & telecommunications	16,0	26,9	40,4	34,5	38,4	44,3
Pharmaceuticals	10,0	10,5	4,9	5,1	5,1	4,1
Scientific instruments	44,3	19,9	10,1	9,6	14,2	19,0
Electrical machinery	2,9	2,2	2,9	3,2	3,6	2,8
Non-electrical machinery	7,2	11,3	9,5	10,4	9,4	7,3
Chemicals	6,4	5,5	3,0	3,2	4,1	4,3
Armaments	—	9,4	2,8	3,1	1,1	4,5
Imports						
T o t a l high-tech	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Aerospace	2,1	0,8	4,3	4,3	5,5	2,8
Computers & office machinery	24,5	28,8	26,8	25,9	24,9	17,6
Electronics & telecommunications	33,3	26,5	35,9	36,8	32,7	42,9
Pharmaceuticals	13,1	12,1	8,2	9,8	10,3	10,8
Scientific instruments	9,4	17,2	11,7	9,5	10,7	9,4
Electrical machinery	5,6	3,6	2,4	3,2	2,5	3,1
Non-electrical machinery	3,0	2,9	4,1	3,3	4,0	4,3
Chemicals	9,0	7,4	6,4	6,9	9,0	8,3
Armaments	—	0,8	0,4	0,3	0,6	0,7

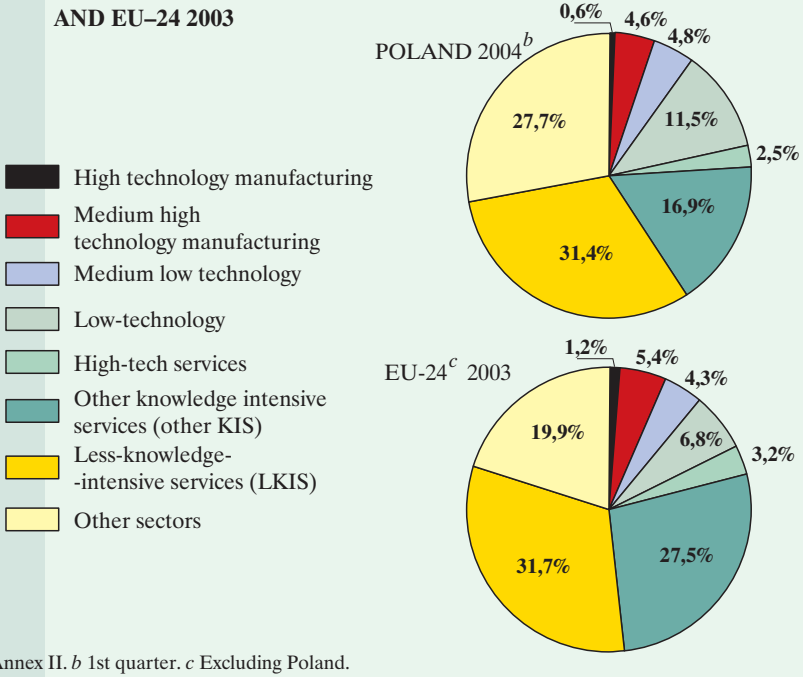
a See Annex I.

Figure 5.3. RATIO OF HIGH-TECH PRODUCTS EXPORTS TO GDP, %, 1992–2003



a Excluding intra-EU trade.
S o u r c e: Key Figures 2002, European Commission 2002.

Figure 5.4. EMPLOYMENT BY SECTOR DEFINED ACCORDING TO THE KNOWLEDGE (R&D) INTENSITY[a], POLAND 2004 AND EU–24 2003



a See Annex II. *b* 1st quarter. *c* Excluding Poland.
S o u r c e: Poland - BAEL (Polish Labour Force Survey); EU - European Union Labour Force Survey, EU LFS (Statistics in Focus, Theme 9 "Science and Technology", 10/2004, Eurostat 2004).

ANNEX I

Classification of high technology products (product approach)

OECD high tech product list of 1995

High tech product groups	SITC Rev. 3 codes
1. Aerospace	792* excl. 792.8, 792.95 and 792.97
	714* excl. 714.89, 714.99
	874.11*
2. Computers & office machinery	751.13
	751.3 excl. 751.33, 751.35
	752* excl. 752.9
	759.97
3. Electronics & telecommunications	763.81
	763.83
	764* excl. 764.93, 764.99
	772.2
	772.61
	773.18
	776.25*
	776.3*
	776.4*
	776.8*
	898.79
4. Pharmaceuticals	541.3*
	541.5*
	541.6*
	542.1
	542.2
5. Scientific instruments	774*
	871*
	872.11
	874* excl. 874.11, 874.2
	881.11
	881.21
5. Scientific instruments (cont.)	884.11
	884.19
	899.6 excl. 899.65, 899.69
6. Electrical machinery.....	778.6* excl. 778.61, 778.66—778.69
	778.7*
	778.84*
7. Non-electrical machinery	714.89*
	714.99*
	718.7*
	728.47
	731.1
	731.3 excl. 731.37, 731.39
	731.44
	731.51
	731.53
	731.6 excl. 731.62—731.64, 731.66 731.67, 731.69
	733.12
	733.14
	733.16
	735.9
	737.33
	737.35
8. Chemicals	522.22
	522.23
	522.29
	522.69
	525*
	574.33
	591*
9. Armaments	891*

* Asterisks indicate the so-called leading-edge products.

S o u r c e: Revision of the High-Technology Sector and Product Classification, STI Working Paper 1997/2, OECD, Paris 1997.

ANNEX II

Eurostat/OECD classification of economic activities based on R&D intensity (industry approach)

Sectors	NACE Rev. 1.1 codes
Manufacturing	**15–37**
High technology manufacturing	30, 32 and 33
Medium high technology manufacturing	24, 29, 31, 34 and 35
Medium low technology	23 and 25–28
Low-technology	15–22 and 36–37
Service sector	**50–99**
Knowledge-intensive services (KIS):	
"high-tech" services	64, 72, 73
other knowledge-intensive services	61, 62, , 65, 66, 67, 70, 71, 74, 80, 85, 92
Less-knowledge-intensive services (LKIS)	50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99
Other sectors:	
Agriculture, hunting and forestry	01, 02, 05
Mining and quarrying	10, 11, 12, 13, 14
Electricity, gas and water supply	40, 41
Construction	45

S o u r c e: Statistics in Focus, Theme 9 ”Science and Technology”, 10/2004, Eurostat 2004.

VI TECHNOLOGY BALANCE OF PAYMENTS (TBP)

TECHNOLOGY BALANCE OF PAYMENTS (TBP)

The TBP registers the commercial transactions related to international technology transfers. It consists of money paid or received for the acquisition and use of patents, licences, trademarks, designs, know-how and closely related technical services (including technical assistance) and for industrial R&D carried out abroad, *etc.*

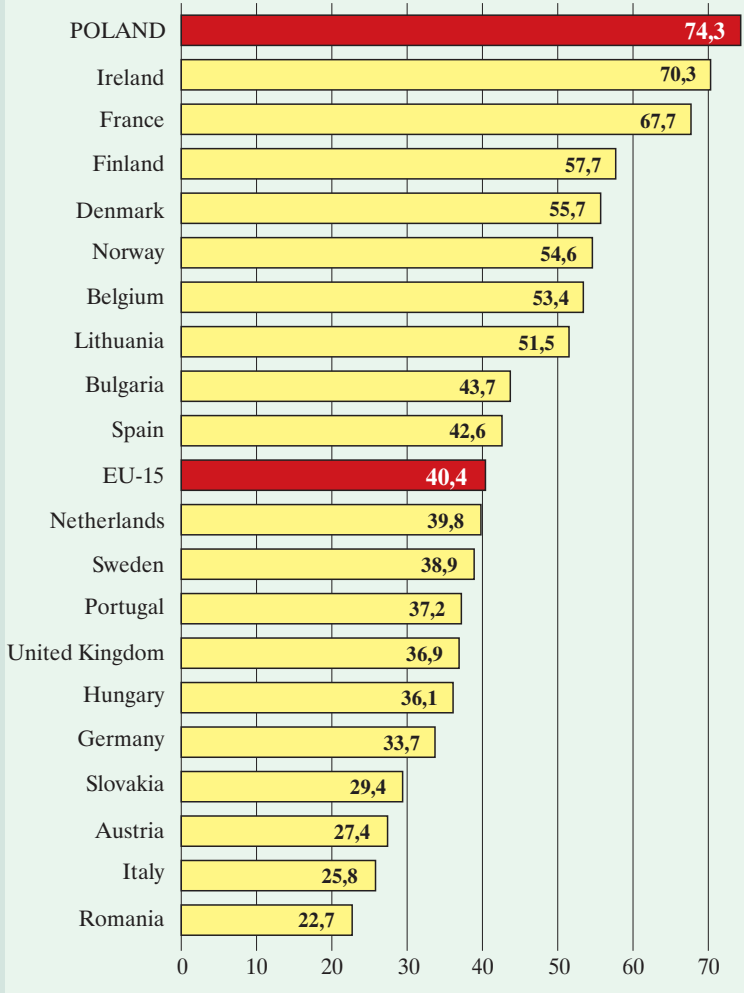
Table 6.1. Technology balance of payments, 1995–2002

Specification	1995	1996	1997	1998	1999	2000	2001	2002
Receipts:								
in million PLN	560,0	543,4	640,8	493,7	511,9	591,3	723,5	1005,0
ratio to gross domestic product in %	0,18	0,15	0,14	0,09	0,08	0,09	0,10	0,13
Payments in million PLN	568,4	954,8	1349,3	1420,9	2650,8	3535,0	3253,5	4262,2
Balance:								
in million PLN	–8,4	–411,4	–708,5	–927,2	–2138,9	–2943,7	–2530,0	–3257,2
ratio to gross domestic product in %	–0,00	–0,11	–0,15	–0,17	–0,35	–0,43	–0,34	–0,42
Coverage ratio (receipts/payments)	0,99	0,57	0,47	0,35	0,19	0,15	0,22	0,24
Total transactions (receipts+ +payments):								
in million PLN	1128,4	1498,2	1990,1	1914,6	3162,7	4126,3	3977,0	5267,2
ratio to gross domestic product in %	0,37	0,39	0,42	0,35	0,51	0,60	0,53	0,68

S o u r c e: data of the National Bank of Poland and GUS.
N o t e. Indicators presented in the table have been compiled in accordance with the TBP Manual recommendations.

VII HUMAN RESOURCES FOR SCIENCE AND TECHNOLOGY (HRST)

Figure 7.1. GRADUATES FROM TERTIARY EDUCATION IN 2001 *PER* THOUS. POPULATION AGED 20-29 IN SELECTED EUROPEAN COUNTRIES



S o u r c e: Statistics on Science and Technology in Europe, Data 1991–2001, Panorama of the European Union, 2003 Edition, Theme 9: Science and Technology, European Commission/Eurostat, Luxembourg 2004; Poland - data of the GUS.

Tabl. 7.1. System of tertiary education (university level) in Poland — higher education institutions, school year 2003/04

Type of school		Number of schools
T o t a l	1995/96	179
	2002/03	377
	2003/04	**400**
State		**126**
Universities		16
Technical universities		18
Agricultural academies		8
Academies of economics		5
Teacher education schools		6
Medical academies		10
Merchant marine academies		2
Physical academies		6
Fine arts academies		18
Theological academies		1
Higher vocational schools		26
Academies of the Ministry of National Defence		8
Academies of the Ministry of the Interior and Administration		2
Non-state		**274**
Universities		1
Technical universities		4
Agricultural academies		1
Academies of economics		88
Teacher education schools		11
Fine arts academies		4
Theological academies		13
Higher vocational schools		125
Other (non-state with a university profile)		27

Besides, in the school year 2002/03 there were 2857 post-secondary schools: post secondary vocational schools and teacher training colleges (in 1995/96 — 1432).

Table 7.2. Top higher education institutions in Poland as regards the number of students, school year 2002/03

Rank	Name	Number of students in school year 2002/03
1	Warsaw University	53148
2	Adam Mickiewicz University in Poznań	45123
3	Wrocław University	42089
4	University of Silesia in Katowice	41134
5	University of Łódź	40083
6	Jagiellonian University in Kraków	35977
7	University of Szczecin	34292
8	University of Warmia and Mazury in Olsztyn	33661
9	Maria Curie-Skłodowska University in Lublin	32996
10	Warsaw University of Technology	31179
11	Nicolaus Copernicus University in Toruń	31625
12	Wrocław University of Technology	31297
13	Silesian University of Technology in Gliwice	30844

Figure 7.2. STUDENTS ENROLLED IN TERTIARY EDUCATION *PER* 10 THOUS. POPULATION, 1970/71–2003/04

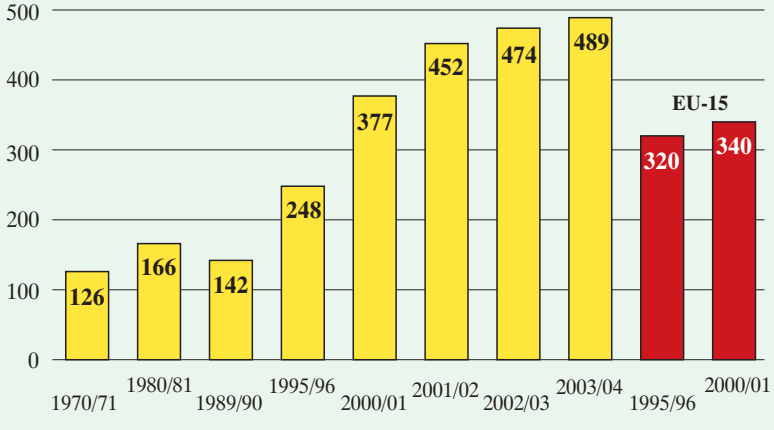
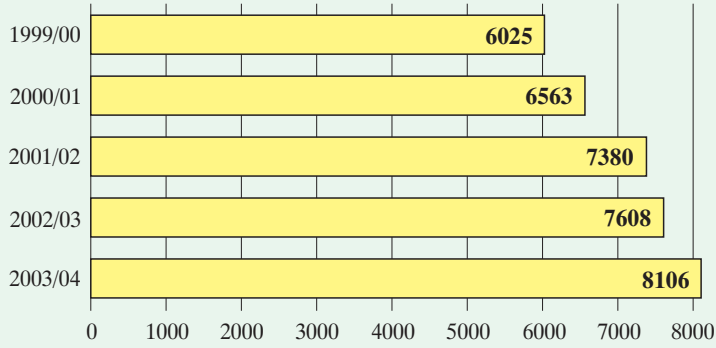


Figure 7.3. FOREIGN STUDENTS IN TERTIARY EDUCATION, SCHOOL YEARS 1999/2000–2003/04



In 2003/04, foreign students in tertiary education accounted for 4,36 ‰ of the overall student population.

Figure 7.4. FOREIGN STUDENTS IN TERTIARY EDUCATION BY COUNTRY OF ORIGIN, SCHOOL YEAR 2003/04

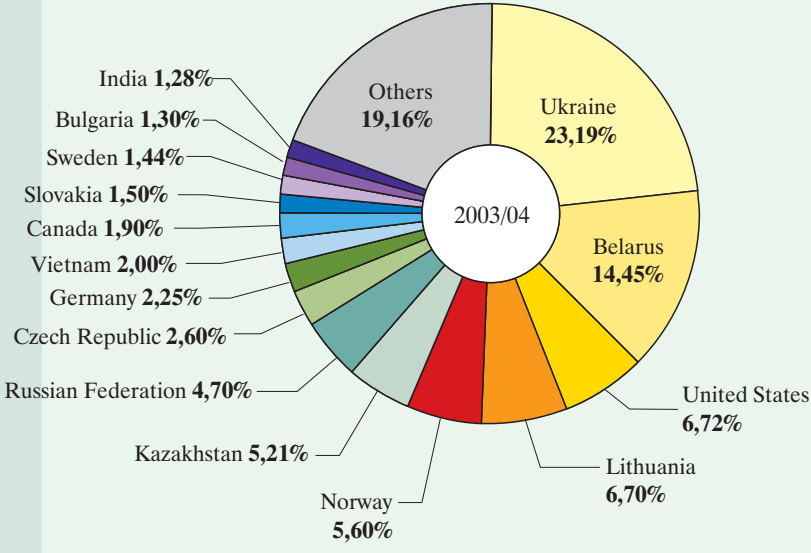
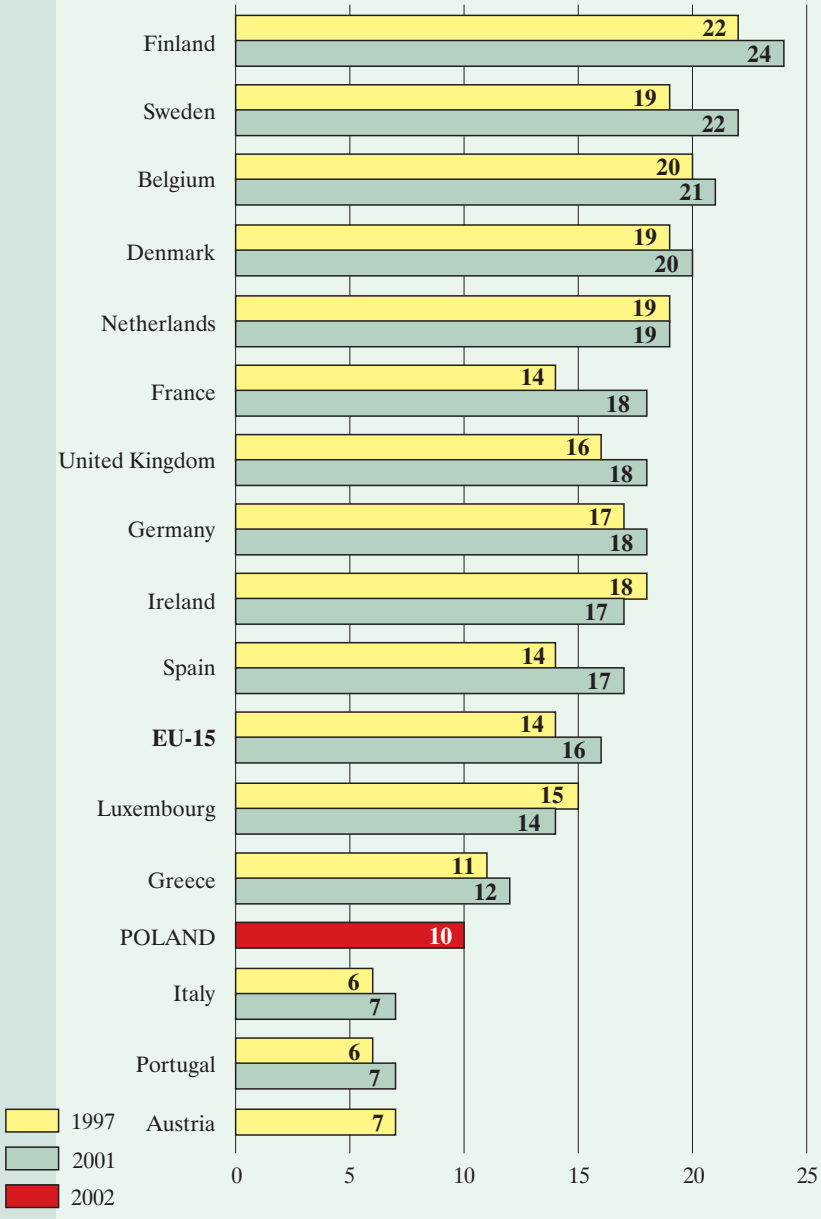
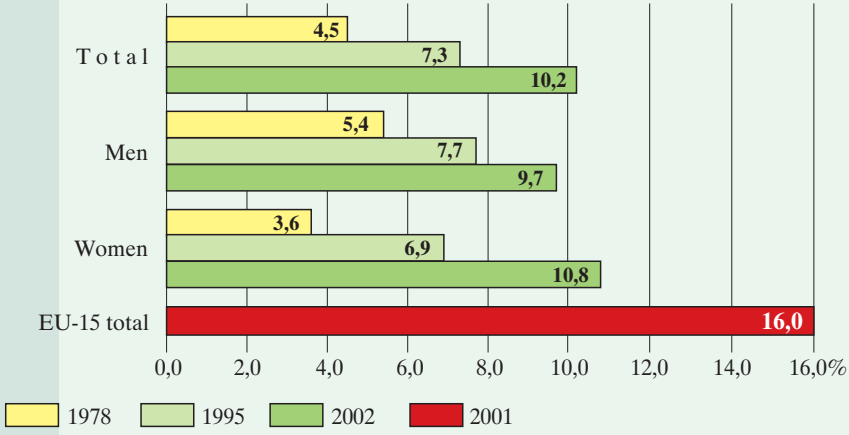


Figure 7.5. POPULATION WITH TERTIARY EDUCATION AGED 15 AND OVER IN EU MEMBER STATES AND IN POLAND, 1997–2002



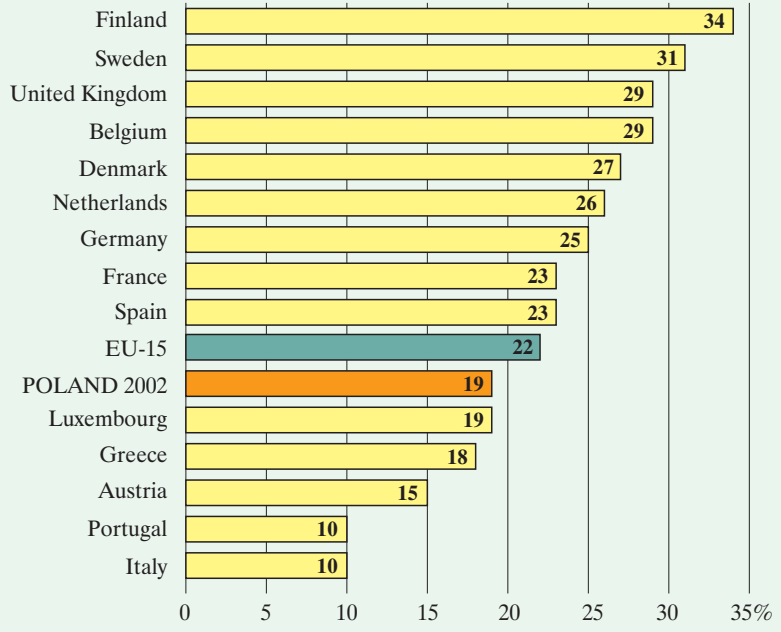
S o u r c e: Statistics in Focus, Theme 9-5/2003, data of the CLFS , Eurostat, 2003; Poland – data of the National Population and Housing Census 2002.

Figure 7.6. POPULATION WITH TERTIARY EDUCATION AS A % OF POPULATION AGED 15 AND OVER, BY GENDER, 1978–2002



Source: Poland – 1978 and 2002 – data of the National Population and Housing Census; EU-15 – *Statistics in Focus*, Theme 9-5/2003, data of the Community Labour Force Survey (CLFS), Eurostat 2003.

Figure 7.7. POPULATION WITH TERTIARY EDUCATION AS A % OF POPULATION AGED 25–59 IN EU MEMBER STATES AND IN POLAND, 2000



Source: Third European Report on Science and Technology Indicators 2003, European Commission, Brussels 2003; Poland – data of the National Population and Housing Census 2002.

Table 7.3. Population with tertiary education by educational level and gender, 2002
As of 20 V 2002

Gender	Population				
	grand total	of which with tertiary education			
		total	with scientific degree[a] (HD[b] and/ /or PhD)	with Master's title or equivalent (higher tertiary education)	with title of licenciate or equivalent (lower tertiary education)
In absolute therms – thous.					
Poland	**38230,1**	**3203,5**	**107,7**	**2277,3**	**818,5**
Men	18516,4	1448,0	70,1	955,2	422,7
Women	19713,7	1755,5	37,6	1322,1	395,8
In % gender=100,0					
Poland	**x**	**100,0**	**3,4**	**71,1**	**25,5**
Men	x	100,0	4,8	66,0	29,2
Women	x	100,0	2,1	75,3	22,6
level of education=100,0					
Poland	**x**	**100,0**	**100,0**	**100,0**	**100,0**
Men	x	45,2	65,1	41,9	51,6
Women	x	54,8	34,9	58,1	48,4

a Holders of doctorate degrees (ISCED 97 – 6). *b* The habilitated doctor's degree (HD), which is higher than a doctorate (second doctorate), is peculiar to Poland. The degree is awarded on the basis of an appropriate dissertation and is necessary for obtaining the title of professor and a professorial post in scientific institutions.

S o u r c e: National Population and Housing Census 2002.

In the HRST population in Poland women play a very important role. According to the GUS surveys, in the period under review women accounted for:

- 54,8% of the total number of persons with tertiary education (HRSTE) — according to the National Population and Housing Census 2002,
- 61% of the total number of persons working in the ISCO-88 major group no. 2 *Professionals* including "occupations whose main tasks require a high level of professional knowledge and experience" (2003),
- 57% of the overall student population (2003).

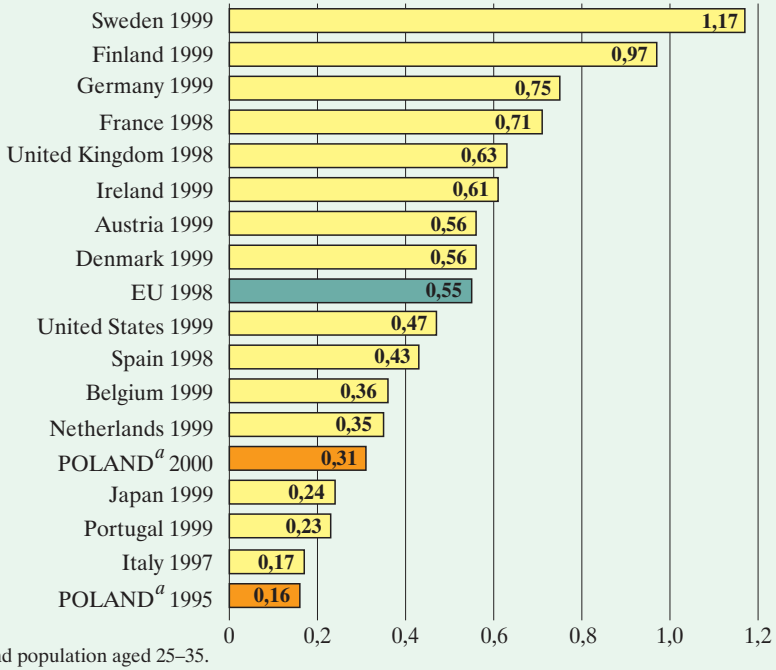
Table 7.4. Scientific degrees awarded in 1991–2003 by recipients' gender

Specification	1991	1995	2000	2002	2003
In absolute therms					
Title of professor	**451**	**367**	**470**	**789**	**578**
Men	350	306	359	575	423
Women	101	61	111	214	155
Scientific degrees:					
Habilitated doctor (HD)[a]	**593**	**628**	**829**	**923**	**803**
Men	458	457	589	674	545
Women	135	171	240	249	258
Doctor (PhD)	**1500**	**2300**	**4400**	**5450**	**5460**
Men	1071	1537	2568	3016	2897
Women	429	763	1832	2434	2563
In %					
Title of professor	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Men	77,6	83,3	76,3	72,9	73,2
Women	22,4	16,7	23,7	27,1	26,8
Scientific degrees:					
Habilitated doctor (HD)[a]	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Men	77,2	72,8	71,0	73,0	67,9
Women	22,8	27,2	29,0	27,0	32,1
Doctor (PhD)	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Men	71,4	66,8	58,3	55,3	53,1
Women	28,6	33,2	41,7	44,7	46,9

a See footnote *b* to the table 7.3.

S o u r c e: data of the Chancellery of the President of the Republic of Poland and the Ministry of National Education and Sport (MENiS).

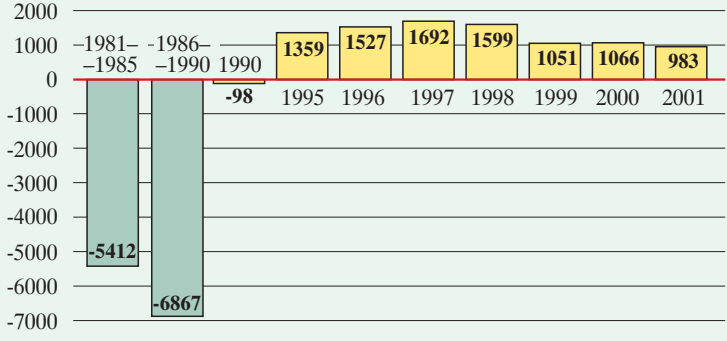
Figure 7.8. NEW PhDs IN EXACT AND NATURAL SCIENCES AND ENGINEERING *PER* THOUSAND POPULATION AGED 25–34 IN SELECTED COUNTRIES



a *Per* thousand population aged 25–35.

S o u r c e: Towards a European Reaserch Area, Key Figures 2001, Special edition. Indicators for benchmarking of national research policies, European Commission, Brussels 2001; Poland – data of the Information Processing Centre (OPI).

Figure 7.9. BALANCE OF INTERNATIONAL MIGRATION OF POPULATION WITH TERTIARY EDUCATION FOR PERMANENT RESIDENCE (NET MIGRATION), 1981–2001



S o u r c e: data of the Central Statistical Office of Poland on the basis of gminas (unit of administrative division of the country) documentation regarding the registration of people arriving to Poland for permanent residence (immigration) as well as regarding the removal from registration of people leaving Poland for permanent residence abroad (emigration).

Poland has a long and rich tradition as regards the system of education.

The oldest Polish university — Cracow Academy, today's Jagiellonian University (Uniwersytet Jagielloński, abbr. UJ) — was founded in 1364 in Cracow (the ancient capital of Poland) by King Casimir the Great, the last representative of the Piast dynasty (the Piast dynasty was a ducal and royal House that founded Polish state, between Oder and Bug rivers, in mid-X century).

The motto of the Jagiellonian University is *Plus ratio quam vis* (more reason than force).

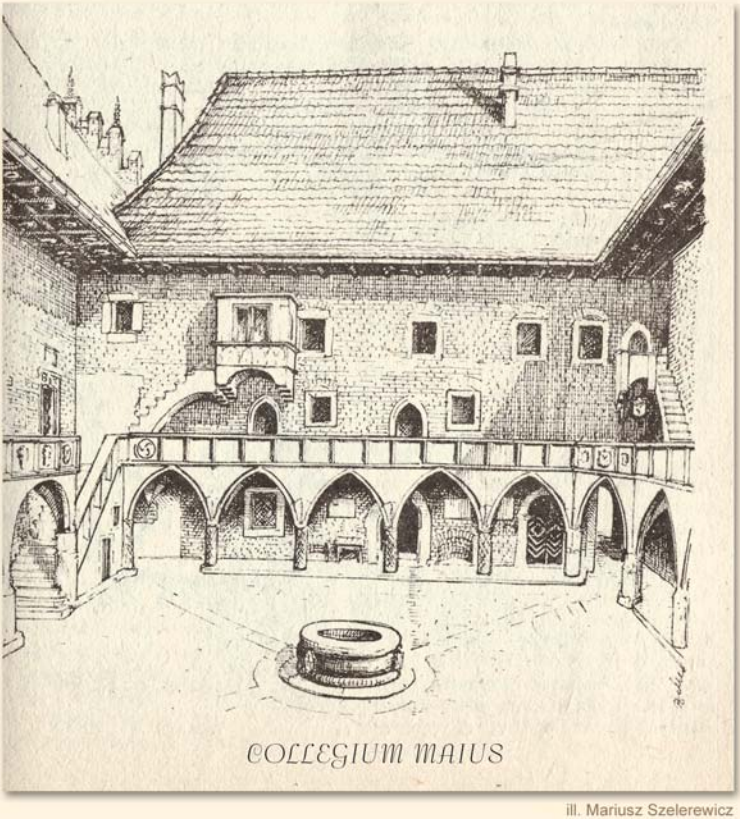
Chronologically, the Cracow Academy was the second university in the Central, Eastern and Northern Europe. The first one was the Charles' University in Prague (the first Slav *studium generale*); the next were universities in Vienna (1365), Pecs (Hungary, 1367), Heidelberg and Köln (the oldest German universities, respectively 1385 and 1388).

Among the most eminent graduates from the Cracow Academy are: Mikołaj Kopernik (Nicolaus Copernicus, great Polish astronomer, author of the epochal work *De revolutionibus orbium coelestium*), Jan Długosz (Joannes Dlugossius, outstanding Polish historian and geographer of the 15th century, tutor of the King's children, author of the monumental work *Historiae Poloniae libri XII*), Jan Kochanowski (great Polish poet of the 16th century, one of the creators of the Polish literary language) and Pope John Paul II.

In 1773, there was established in Poland the first in Europe institution playing the role of the ministry of education — the Commission for National Education (Komisja Edukacji Narodowej, abbr. KEN). It was a State institution subordinate to the King. Its aim was to reform and modernize the educational system of the country.

KEN introduced modern methods and organization of teaching and new syllabi. It organized a system of State secular schools and a network of parochial schools for peasants' children. It also restored and reorganized the Cracow Academy and introduced Polish — instead of Latin — as its official language.

KEN worked for twenty years — till 1794 when the State named *Rzeczpospolita* — the Republic (of Three Nations), a part of which Poland formed, was erased from the map of Europe.



ill. Mariusz Szelerewicz

Collegium Maius is the oldest university edifice in Poland. Its history goes back to the year 1400, when King Władysław Jagiełło purchased the private house and donated it to the Cracow Academy. During the 15th century Collegium Maius was extended.

Between 1949 and 1964, on the personal initiative of Prof. Karol Estreicher Jr., the whole building underwent a major refurbishment and conservation. In this time the Collegium Maius was also designated as the seat of the Jagiellonian University Museum, home to ancient university collections, including the collection of the old scientific instruments.

photo. Elżbieta Kuźmiuk

photo. Anna Prażuch

The greatest, nowadays, as regards the number of students, Polish university, the Warsaw University (Uniwersytet Warszawski, abbr. UW), was founded in 1816 by the government of the so-called Congress Kingdom of Poland.

photo. Anna Prażuch

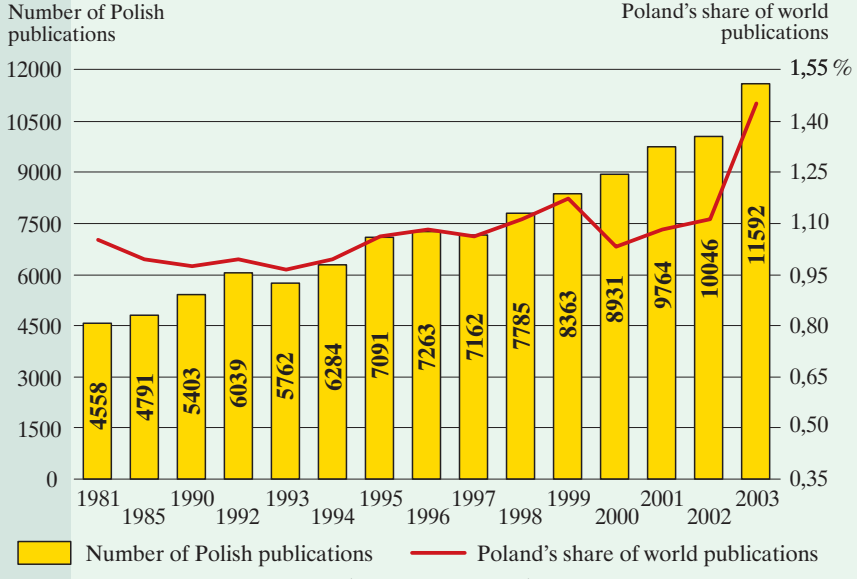
Warsaw University is now among the world leaders in such a modern research field as software engineering, the evidence of which is, among others, the fact that UW students and graduates are individual and team winners in the worldwide international competition in this field (*e.g.* TopCoder or International Team Programming Contest).

photo. Elżbieta Kuźmiuk

Kraków, Wawel Royal Castle. Zygmunt Chapel (Wawel Cathedral)

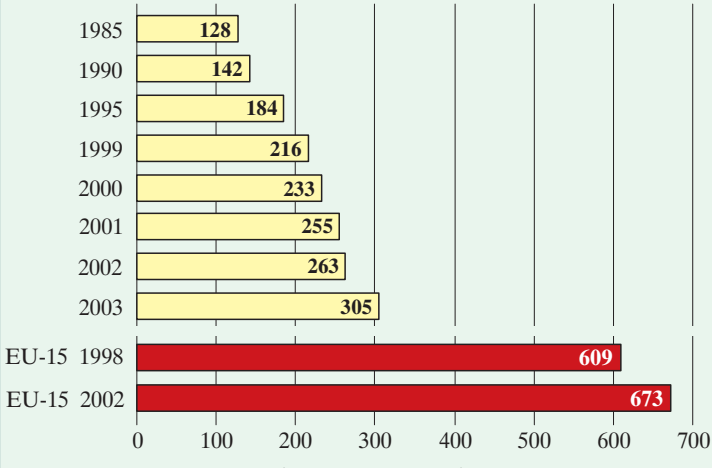
VIII BIBLIOMETRIC INDICATORS

Figure 8.1. POLISH SCIENTIFIC PUBLICATIONS, 1981–2003



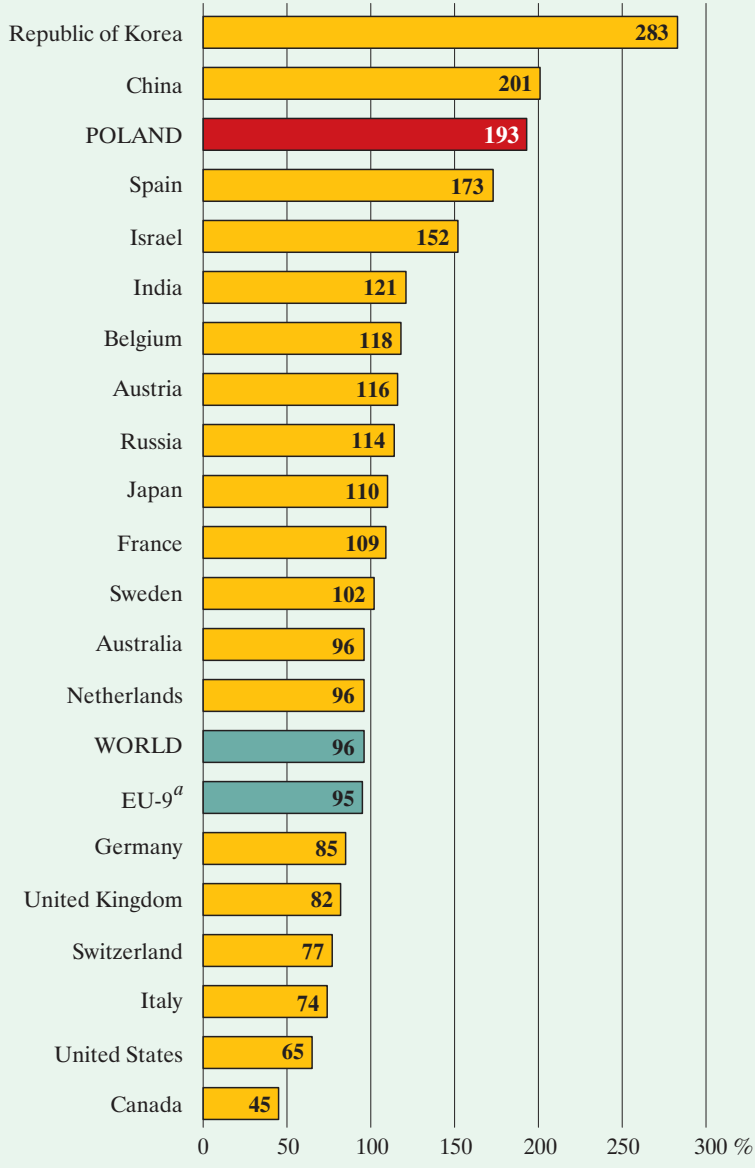
S o u r c e: Institute for Scientific Information (ISI, Philadelphia, US).

Figure 8.2. NUMBER OF SCIENTIFIC PUBLICATIONS *PER* MILLION POPULATION, 1985–2003



S o u r c e: Institute for Scientific Information (ISI, Philadelphia, US).

Figure 8.3. DEVELOPMENT OF NANOSCIENTIFIC PUBLICATIONS, GROWTH RATE IN 1995–1999, %

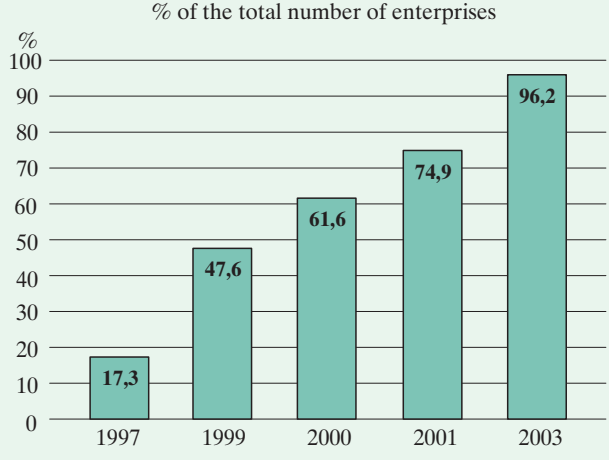


a Excluding Denmark, Greece, Ireland, Luxembourg, Portugal and Finland.

S o u r c e: Third European Report on S&T Indicators, European Commision (DG Research on the basis of ISI data), Brussels 2003.

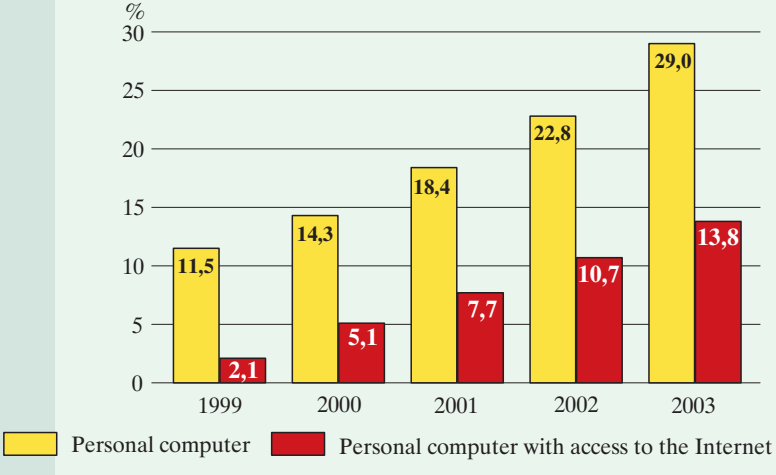
IX ICT TECHNOLOGIES

Figure 9.1. INDUSTRIAL ENTERPRISES WITH ACCESS TO THE INTERNET, %, 1997–2003[a]



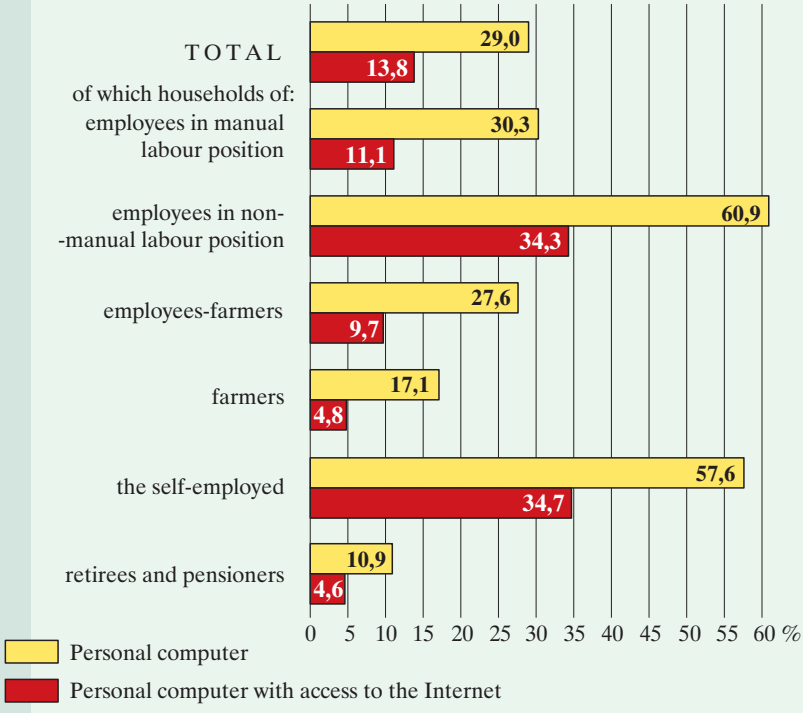
a Data concern enterprises with more than 49 employees in *Mining and quarrying* (NACE 10-14), *Manufacturing* (NACE 15-37) and *Electricity, gas and water supply* (NACE 40-41).

Figure 9.2. HOUSEHOLDS FURNISHED WITH PERSONAL COMPUTERS, %, 1999–2003



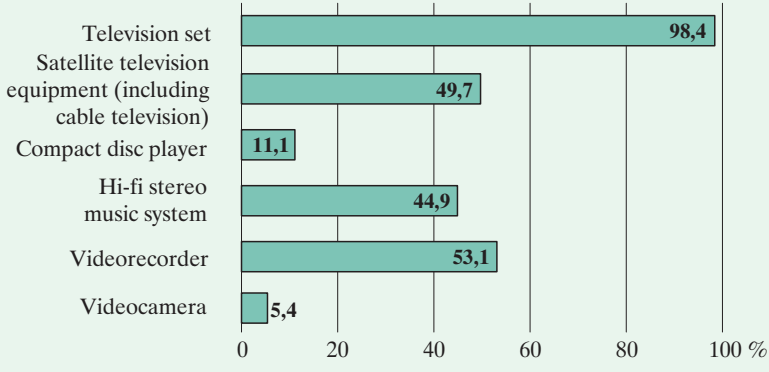
S o u r c e: GUS - Survey of households budgets.

Figure 9.3. HOUSEHOLDS FURNISHED WITH COMPUTER EQUIPMENT BY SOCIO-ECONOMIC GROUP, %, 2003



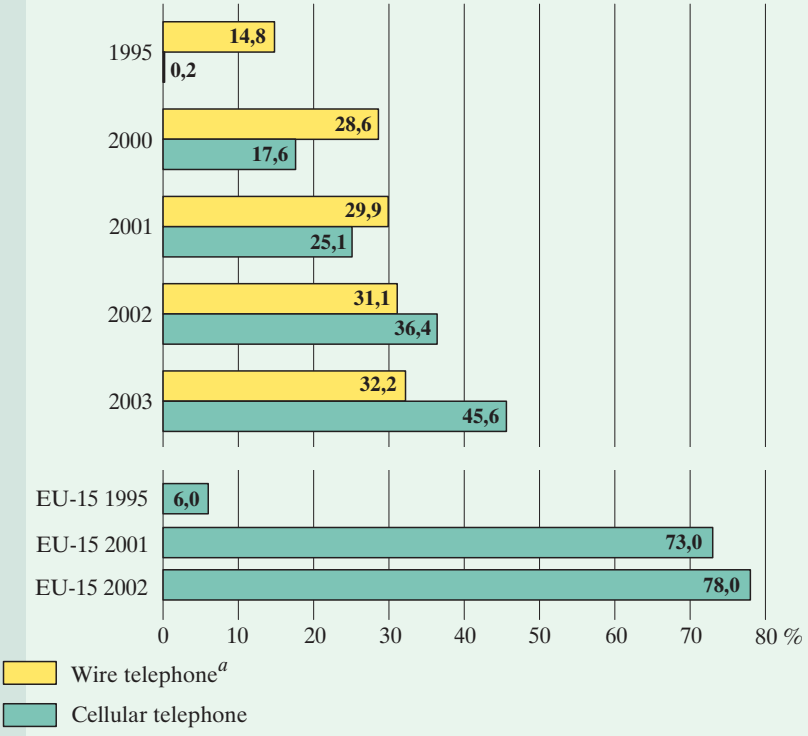
S o u r c e: GUS - Survey of households budgets.

Figure 9.4. HOUSEHOLDS WITH AUDIOVISUAL EQUIPMENT, %, 2003



S o u r c e: GUS - Survey of households budgets.

Figure 9.5. TELEPHONE SUBSCRIBERS *PER* 100 POPULATION, 1995–2003
As of 31 XII



a In 1995 - standard main line (fixed line telephone subscribers); in 2000–2003 telephone main line including standard main line and accessible ISDN. Data concern operators of the public telecommunication network.

X INTERNATIONAL CO-OPERATION

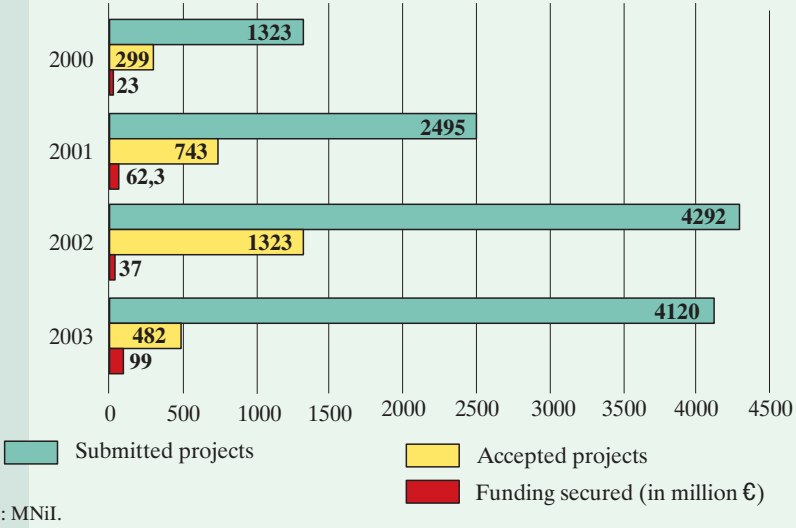
INTERNATIONAL CO-OPERATION

Poland has become a full member of most European and Euro-Atlantic research organizations and programmes: EU RTD Framework programmes, COST, EUREKA, CERN, DESY and the NATO Science Programme. The main focus in respect of European research co-operation is on its three key forms, *i.e*. EU research programmes as well as co-operation through EUREKA and COST.

In 2003, Poland concluded 30 intergovernmental S&T agreements with other countries, the number of bilateral projects in 2000–2003 was between 1100 and 1266.

Poland has participated in the European Union RTD Framework programmes since 1999, first as an associated country and, presently, as a Member State. Polish participation in those programmes in 2000–2003 is characterized by the figure 10.1.

Figure 10.1. NUMBER OF SUBMITTED AND ACCEPTED PROJECTS WITH POLISH PARTICIPANTS IN THE EU'S 5TH AND 6TH FRAMEWORK PROGRAMMES, 2000–2003

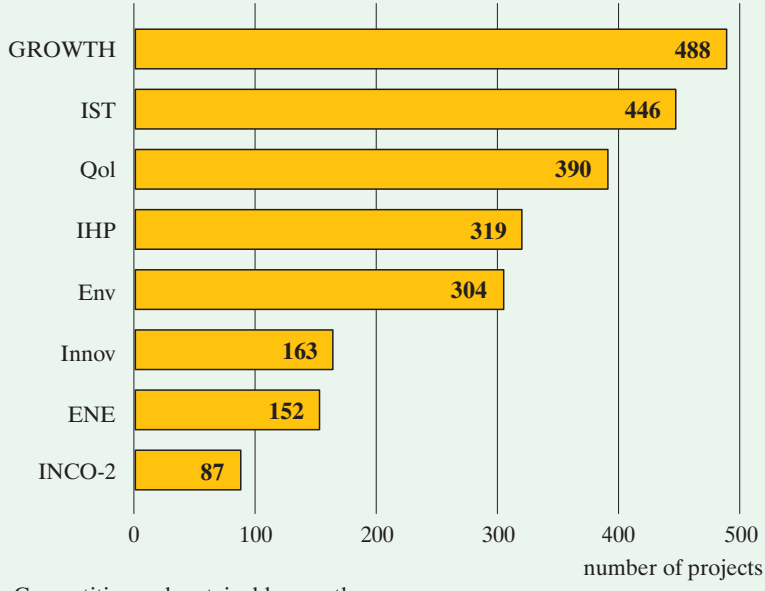


Source: MNiI.

As it could be noticed in the fig.10.1 — the participation of Polish research teams in the 5th FP increased steadily, both in terms of submitted and ranked projects. The start of 6th FP and introduction of new instruments like Integrated Projects resulted in a marginal fall in the number of submitted projects and in very serious decrease in the number of ranked projects. This could be attributed to the introduction of the new financing instruments and to the change of the formula of the 6th FP that became less friendly to small entities.

The most popular program in Poland in the 5th FP (between 2000 and 2002) was the Competitive and Sustainable Growth (Growth) and the User-friendly Information Society (IST); the corresponding figures in the 5th FP were 488 and 446, respectively.

Figure 10.2. POLISH PARTICIPATION IN THE EU'S 5TH FRAMEWORK PROGRAMME BY THEMATIC PROGRAMME, 2000–2002

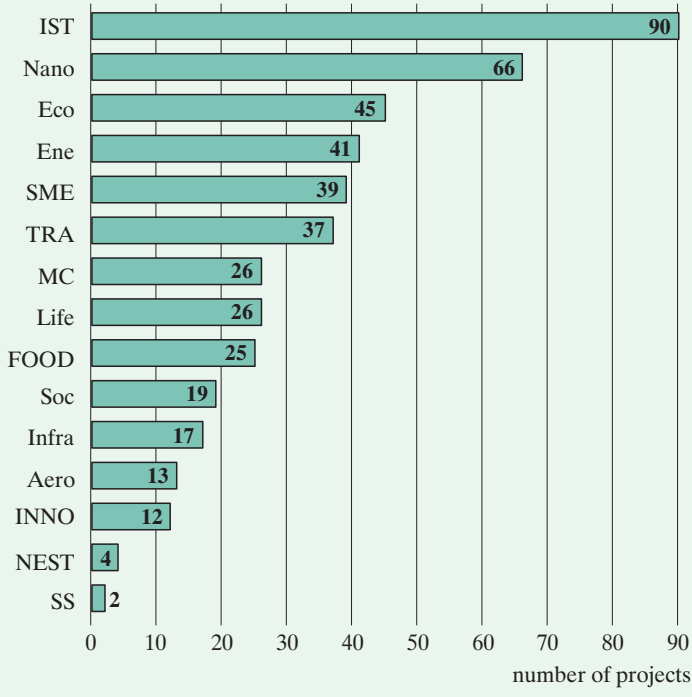


GROWTH - Competitive and sustainable growth
IST - User-friendly information society
QoI - Quality of life and management of living resources
IHP - Improving the human research potential and the socio-economic knowledge base
Env - Environment and sustainable development
Innov - Promotion of innovation and encouragement of SME participation
ENE - Energy
INCO-2 - Confirming the international role of community research

Source: MNiI.

In 6th FP (2003) Polish organizations mainly involved in the fields of IST and Nanotechnology (Nano).

Figure 10.3. POLISH PARTICIPATION IN THE EU'S 6TH FRAMEWORK PROGRAMME BY THEMATIC PRIORITIES, 2003

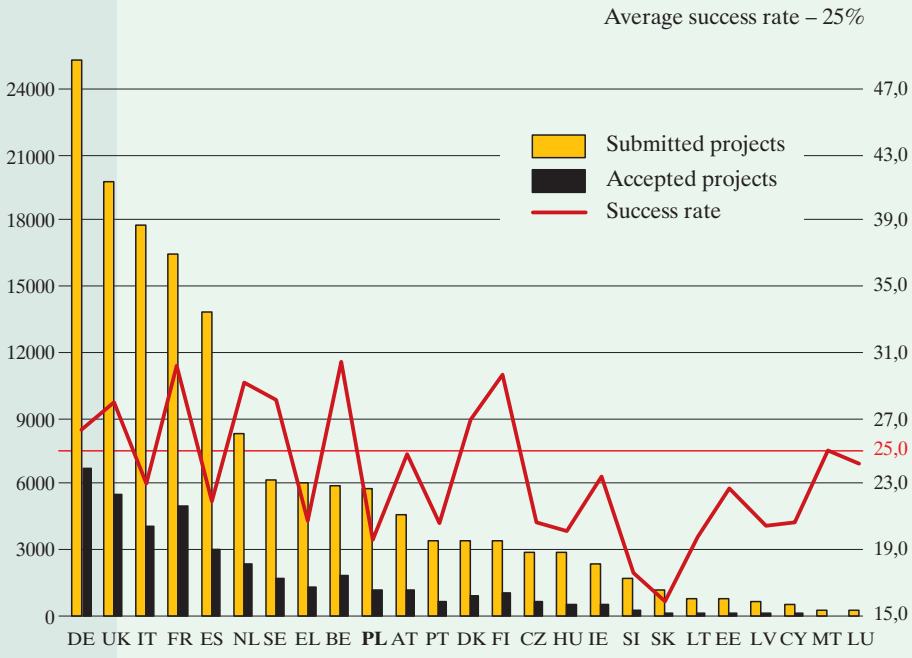


IST - Information society technologies
Nano - Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production process and devices
Eco - Global change and ecosystems
Ene - Sustainable energy systems
SME - SME activities
TRA - Sustainable surface transport
MC - Maria Curie Actions – Human resources and mobility
Life - Life sciences, genomics and biotechnology for health
FOOD - Food quality and safety
Soc - Citizens and governance in a knowledge-based society
Infra - Research infrastructure
Aero - Areonautics and space
INNO - Research and innovation
NEST - New and emerging science and technology
SS - Science and society

S o u r c e: MNiI.

Figure 10.4. COUNTRY PARTICIPATION IN THE EU'S 6TH FRAMEWORK PROGRAMME, 2003–2005

Country participation in submitted and accepted proposals

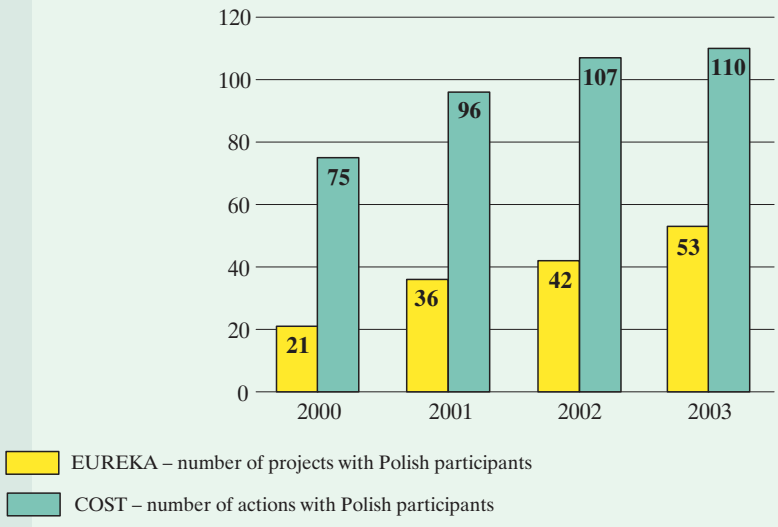


	DE	UK	IT	FR	ES	NL	SE	EL	BE	**PL**	AT	PT	DK
	25322	19708	17803	16455	13789	8260	6165	6059	5962	**5773**	4617	3461	3438
	6657	5494	4091	4972	3027	2409	1737	1259	1818	**1137**	1144	716	929
	26,3	27,9	23,0	30,2	22,0	29,2	28,2	20,8	30,5	**19,7**	24,8	20,7	27,0

	FI	CZ	HU	IE	SI	SK	LT	EE	LV	CY	MT	LU
	3385	2896	2840	2324	1686	1219	822	795	621	527	248	210
	1006	599	573	544	296	194	163	181	127	109	62	51
	29,7	20,7	20,2	23,4	17,6	15,9	19,8	22,8	20,5	20,7	25,0	24,3

Source: MNiI.

Figure 10.5. POLISH PARTICIPATION IN EUREKA PROJECTS AND IN COST ACTIONS, 2000–2003



S o u r c e: MNiI.

EUREKA Initiative was launched in 1985 with a goal to support the development of competitiveness and productivity of the European industry. The main target of the Initiative is to offer the European industry an opportunity to ”meet” partners from the research community and to obtain support from national funding instruments in order to be able to develop and bring to markets new products, technologies and services in the environment of a lowered business risk.

Eleven years of the Polish presence in the EUREKA Initiative (1994–2005) have so far resulted in participation of Polish research and development units in many interesting projects which results have either been already implemented or are likely to be implemented in Poland and other countries in the near future. Many of these projects were co-funded by the State Committee for Scientific Research and/or the Ministry of Science and Information Society Technologies. In many projects Polish researchers have co-operated with leading companies (*e.g.* Siemens Austria, British Petroleum, Krupp&Thyssen, Staedler, Deassault, Airbus). The fields most widely represented covered environmental protection, new materials and transport.

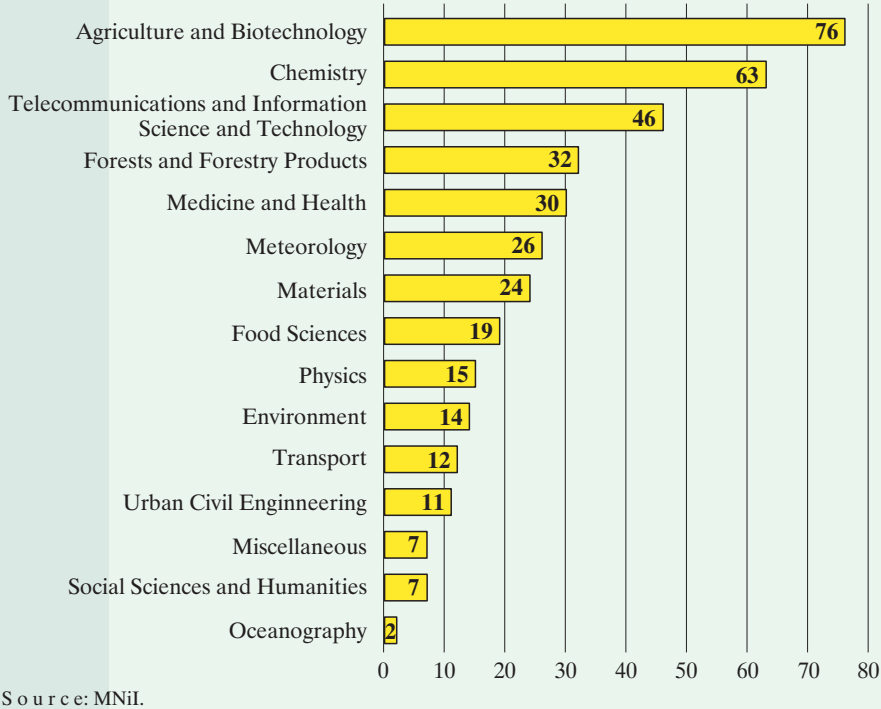
Continuous growth of Polish researchers' participation in COST actions illustrates fig. 10.5.

COST — the acronym for European Co-operation in the field of Scientific and Technical Research — is the oldest and widest European intergovernmental

network for co-operation in research. Established by the Ministerial Conference in November 1971 COST is, presently, used by scientific communities of more than 30 European countries and Israel to co-operate in common research projects supported by national funds. COST aims to network at the European level nationally financed research of a basic pre-competitive, pre-normative or policy-related nature. The co-operation is taking on the form of concerted activities. COST networks are called "actions". The initiative of launching a COST action comes from scientists and technical experts themselves.

Poland has been a member of COST since 1991.

Figure 10.6. TOTAL NUMBER OF COST ACTIONS WITH POLISH PARTICIPATION *PER* DOMAIN BETWEEN 2000 AND 2003



Source: MNiI.

ABBREVIATIONS AND ACRONYMS

AMT = Advanced Manufacturing Technologies
BERD = Expenditure on R&D in the Business Enterprise Sector
CERN = European Organisation for Nuclear Research
CLFS = Community Labour Force Survey
DESY = German Synchrotron Research Centre
EU = European Union
EUREKA = European Research Co-ordination Agency — the EUREKA Initiative
€ = Euro
FTE = Full-time Equivalent (on R&D)
GERD = Gross Domestic Expenditure on R&D
GOVERD = Government Intramural Expenditure on R&D
GUS = Central Statistical Office of Poland
HC = Head count
HERD = Expenditure on R&D in the Higher Education Sector
HRST = Human Resources for Science and Technology
HRSTE = Educationally qualified HRST population
IC = Information and Communication (technologies)
ISCED = International Standard Classification for Education
ISCO = International Standard Classification of Occupations
NACE = Statistical classification of economic activities in the European Community
OECD = Organisation for Economic Co-operation and Development
PLN = Polish national currency (zloty)
PPP = Purchasing Power Parity
R&D = Research and Experimental Development
RSE = Research scientists and engineers, researchers
RTD = Research and Technological Development
$ = US dollar (USD)
SITC = Standard International Trade Classification
thous. = thousand
TQM = Total Quality Management

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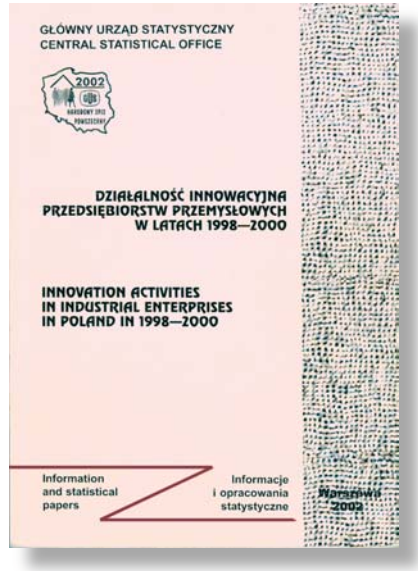

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