MINISTRY OF SCIENCE
AND HIGHER EDUCATION
OF THE RUSSIAN FEDERATION

FEDERAL STATE
STATISTICS SERVICE

HIGHER SCHOOL OF ECONOMICS
NATIONAL RESEARCH UNIVERSITY

SCIENCE. TECHNOLOGY. INNOVATION

Pocket Data Book

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Editorial board: Leonid Gokhberg and Yaroslav Kuzminov

Authors: Kirill Ditkovskiy, Evgeniya Evnevich, Svetlana Fridlyanova, Konstantin Fursov, Leonid Gokhberg, Maxim Kotsemir, Irina Kuznetsova, Svetlana Martynova, Alena Nefedova, Valentina Polyakova, Tatyana Ratay, Larisa Rosovetskaya, Vitaliy Roud, Galina Sagieva, Ekaterina Streltsova, Anton Suslov, and Irina Tarasenko

With contributions by Irina Varzanovtseva

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This pocket data book contains main S&T and innovation indicators for the Russian Federation. The publication includes the most recent statistical data on R&D input and output, as well as international comparisons.

The data book includes information of the Russian Federal State Statistics Service, Ministry of Science and Higher Education of the Russian Federation, Russian Federal Service for Intellectual Property (Rospatent), Organisation for Economic Co-operation and Development (OECD), European Statistical Office (Eurostat), UNESCO, World Intellectual Property Organisation (WIPO), national statistical offices of other countries, and results of own methodological and analytical studies of the HSE Institute for Statistical Studies and Economics of Knowledge.

In some cases, 2019 data are preliminary.

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Symbols used in tables are:

- ... data not available and not included in the totals,
- data not applicable.

In some tables, the sum of the breakdown may not add to the total because of rounding.

INFOGRAPHICS

R&D personnel: 2019

R&D personnel

682.5 thousand persons

Researchers

348.2 thousand persons

Gender

Average age

64 years
Doctors of Science **51 years**
Candidates of Science **43 years**
Without scientific degrees

Scientific degree

R&D funding: 2019

Gross domestic expenditure on R&D

Sources of funds, %

Publication activity by country: 2019

(Web of Science)

2,175,178 world total of articles

XX Number of articles

● Country's share in the world total number of articles

Patent applications by country of origin: 2018

(Rospatent and WIPO)

Innovative activity: 2019

- Innovative goods and services as a percentage of total sales
- Intensity of innovation expenditure, %
- Innovation activity of enterprises, %

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INSTITUTIONS

1.1. R&D institutions by type

	2000	2010	2017	2018	2019
Total	4099	3492	3944	3950	4051
Research institutes	2686	1840	1577	1574	1618
Design organisations	318	362	273	254	255
Construction project and exploration organisations	85	36	23	20	11
Experimental enterprises	33	47	63	49	44
Higher education institutions	390	517	970*	917	951
Industrial enterprises	284	238	380	419	450
Others	303	452	658	717	722

* Since 2015, the number of institutions includes branches of higher education institutions.

1.2. R&D institutions by sector of performance

	2000	2010	2017	2018	2019
Total	4099	3492	3944	3950	4051
Sectors of performance:					
government	1247	1400	1493	1511	1479
business enterprise	2278	1405	1292	1304	1374
higher education	526	617	1038	998	1057
private non-profit	48	70	121	137	141

1.3. R&D institutions by ownership

	2000	2010	2017	2018	2019
Total	4099	3492	3944	3950	4051
Ownership:					
public	2938	2610	2520	2510	2555
private	388	470	875	880	920
joint	635	304	296	304	310
by state corporations	...	6	106	113	121
foreign and joint (with both Russian and foreign participation)	64	56	85	88	96
others	74	46	62	55	49

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R&D PERSONNEL

2.1. R&D personnel

(headcount)

	2000	2010	2017	2018	2019
Total	887729	736540	707887	682580	682464
Research institutes	718434	435304	407962	394402	401771
Design organisations	56488	157146	125272	115565	112684
Construction project and exploration organisations	6811	6324	1537	1296	508
Experimental enterprises	6145	1558	6030	5747	3284
Higher education institutions	31110	46776	56571	58573	59280
Industrial enterprises	54721	51807	59421	52977	57974
Others	14020	37625	51094	54020	46963

2.2. R&D personnel by occupation

(headcount)

	2000	2010	2017	2018	2019
Total	887729	736540	707887	682580	682464
Researchers	425954	368915	359793	347854	348221
Technicians	75184	59276	59690	57722	58681
Supporting staff	240506	183713	170347	160591	160864
Others	146085	124636	118057	116413	114698

2.3. Percentage distribution of R&D personnel by occupation

2.4. R&D personnel by sector of performance

(headcount)

	2000	2010	2017	2018	2019
Total	887729	736540	707887	682580	682464
Sectors of performance:					
government	255850	259007	268080	270357	227480
business enterprise	590646	423112	377150	347080	379442
higher education	40787	53290	59729	64073	74215
private non-profit	446	1131	2928	1070	1327

2.5. R&D personnel turnover

(headcount)

	Inflow – total	Of which		Outflow – total	Of which	
		higher education graduates	other research institutes' graduates		resigned	were made redundant
2001	132757	14122	21549	137932	93587	3542
2005	109973	13495	15618	122773	81623	6598
2009	93526	13235	13529	97071	58295	5776
2011	94939	13725	11881	100849	62848	2973
2013	94550	11075	13210	93112	59214	2015
2015	100290	11662	14026	98643	58285	4238
2017	92300	9985	12539	98797	57974	4327
2019	89311	11165	11263	89842	54687	2689

2.6. R&D personnel by country

(thousand person-years; in full-time equivalent)

	2000	2010	2019*	Rank**
Russia	1007.3	840.0	753.8	4
Brazil	105.2	243.6	316.5	11
Canada	167.9	233.1	229.2	13
China	922.1	2553.8	4381.4	1
France	327.5	397.8	451.4	9
Germany	484.7	548.7	707.7	5
India	318.4	441.1	553.0	6
Italy	150.1	225.6	345.7	10
Japan	896.8	877.9	896.9	3
South Korea	138.1	335.2	501.2	7
Taiwan	104.6	211.2	262.3	12
United Kingdom	288.6	350.8	463.5	8
United States***	985.0	1200.5	1434.4	2

* Or nearest years for which data are available.

** In global ranking.

*** Number of researchers in full-time equivalent.

2.7. R&D personnel per 10,000 employment by country: 2019*

* Or nearest years for which data are available. Calculated by employment in full-time equivalent.

2.8. Researchers by sector of performance

(headcount)

	2000	2010	2017	2018	2019
Total	425954	368915	359793	347854	348221
Sectors of performance:					
government	129725	131734	130081	131366	113555
business enterprise	267640	197785	186347	171205	185358
higher education	28325	38640	42113	44489	48429
private non-profit	264	756	1252	794	879

2.9. Researchers with scientific degrees

(headcount)

	2000	2010	2017	2018	2019
Researchers with scientific degrees	105911	105114	103327	100330	99912
Doctors of Science	21949	26789	26076	25288	24844
Candidates of Science	83962	78325	77251	75042	75068

2.10. Researchers with scientific degrees as a percentage of the total number of researchers

2.11. Researchers by field of science and technology: 2019

(headcount)

	Researchers	Of which	
		doctors of science	candidates of science
Total	348221	24844	75068
Fields of science and technology:			
natural sciences	79270	10992	30870
engineering and technology	213942	4130	19470
medical and health sciences*	14416	3326	5858
agricultural and veterinary sciences	9459	1214	3925
social sciences	19466	2933	9447
humanities and the arts	11668	2249	5498

* Including psychophysiology.

2.12. Percentage distribution of researchers by age: 2019

2.13. Researchers by country

(thousand person-years; in full-time equivalent)

	2000	2010	2019*	Rank**
Russia	506.4	442.1	400.7	6
Brazil	51.6	134.3	180.0	10
Canada	107.9	158.7	158.9	11
China	695.1	1210.8	1866.1	1
France	172.1	243.5	306.5	8
Germany	257.9	328.0	433.7	4
India	115.9	192.8	341.8	7
Italy	66.1	103.4	152.5	13
Japan	647.6	656.0	678.1	3
South Korea	108.4	264.1	408.4	5
Taiwan	55.5	128.1	154.0	12
United Kingdom	170.6	256.6	305.8	9
United States	985.0	1200.5	1434.4	2

* Or nearest years for which data are available.

** In global ranking.

2.14. Researchers per 10,000 employment by country: 2019*

Headcount

* Or nearest years for which data are available. Calculated by employment in full-time equivalent.

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3

R&D FUNDING

3.1. Gross domestic expenditure on R&D

	2010	2017	2018	2019
Gross domestic expenditure on R&D, thousand roubles:				
at current prices	523377233.9	1019152437.1	1028247644.8	1134786664.6
at constant 2010 prices	523377233.9	614650767.2	558193173.4	593476630.2
Gross domestic expenditure on R&D as a percentage of GDP	1.13	1.11	0.98	1.03

* Here and below in this section, the data at constant prices are calculated using GDP deflator as of April 1, 2020.

3.2. Growth rates of gross domestic expenditure on R&D and gross domestic product

3.3. Gross domestic expenditure on R&D by country

(million current USD PPPs)

	2000	2010	2019*	Rank**
Russia	10504.4	33080.9	44153.7	9
Brazil	16614.0	32509.1	41121.0	11
Canada	16745.6	24897.8	29771.7	13
China	32936.0	212138.1	468062.3	2
France	33282.7	50896.7	68440.9	6
Germany	53905.5	87028.0	141299.9	4
India	17249.6	42433.6	68238.4	7
Italy	15477.5	25400.7	36892.8	12
Japan	98918.3	140565.6	171293.6	3
South Korea	18533.0	52152.9	98451.3	5
Taiwan	9219.1	25057.2	43342.7	10
United Kingdom	25155.2	37564.8	53952.6	8
United States	269513.0	410093.0	581553.0	1

* Or nearest years for which data are available.

** In global ranking.

3.4. Gross domestic expenditure on R&D as a percentage of GDP by country

	2000	2010	2019*
Russia	1.05	1.13	1.03
Brazil	1.05	1.16	1.26
Canada	1.86	1.83	1.54
China	0.89	1.71	2.14
France	2.09	2.18	2.19
Germany	2.41	2.73	3.13
India	0.76	0.79	0.65
Italy	1.00	1.22	1.43
Japan	2.91	3.14	3.28
South Korea	2.13	3.32	4.53
Taiwan	1.91	2.80	3.46
United Kingdom	1.62	1.65	1.73
United States	2.63	2.74	2.83

* Or nearest years for which data are available.

3.5. Federal budget appropriations on civil S&T*

	2010*	2017*	2018*	2019*	2020**
Federal budget appropriations on civil S&T, million roubles	237644.0	377882.2	420472.3	489158.4	509492.8
Basic research	82172.0	116977.6	149550.0	192495.3	197107.8
Applied research	155472.0	260904.6	270922.3	296663.1	312384.9
As a percentage:					
of GDP	0.51	0.41	0.40	0.44	...
of total federal budget appropriations	2.35	2.30	2.52	2.69	3.11

* Sources: annual reports on execution of the consolidated budget of the Russian Federation and budgets of state extra-budgetary funds (according to the Russian Federal Treasury).

** According to Federal Law of December 2, 2019 no. 380-FL 'On Federal Budget for 2020 and the 2021–2022 Planning Period' in the wording of Federal Law of March 18, 2020 no. 52-FL 'On Amendments to the Federal Law "On Federal Budget for 2020 and the 2020–2021 Planning Period"'.

3.6. Government budget appropriations on R&D by country

(million current USD PPPs)

	2000	2010	2019*
Russia**	4685.4	26074.9	32033.9
Brazil***	8589.4	16617.2	20447.3
Canada	4589.7	8478.8	9168.8
China***	11003.1	50951.6	94636.6
France	14883.6	19155.9	18453.3
Germany	17238.1	28608.5	45482.8
India***	...	...	40402.2
Italy	9510.7	12358.1	14330.8
Japan	21227.8	32140.4	41802.8
South Korea	5017.8	16293.9	22679.0
Taiwan	2978.7	7042.4	8665.8
United Kingdom	9494.5	13325.8	13893.0
United States	72681.0	119382.0	147945.0

* Or nearest years for which data is available.

** Federal budget appropriations on S&T.

*** Gross domestic expenditure on R&D financed by the government.

3.7. Gross domestic expenditure on R&D by source of funds (million roubles)

	2000	2010	2017	2018	2019
Gross domestic expenditure on R&D	76697.1	523377.2	1019152.4	1028247.6	1134786.7
Government*	42035.7	368191.8	674344.3	689270.6	752261.0
Of which federal budget appropriations	29639.3	287057.5	536387.3	539896.7	602743.8
Business enterprise sector	25208.4	133499.0	307459.0	303219.2	342833.0
Higher education sector	213.0	2436.6	7901.3	8841.5	9010.7
Private non-profit sector	67.6	682.4	2645.2	2761.1	3462.8
Funds from abroad	9172.4	18567.5	26802.6	24155.3	27219.2

* Including federal budget appropriations, general university funds, and government sector institutions' funds (including own funds).

3.8. Percentage distribution of gross domestic expenditure on R&D by source of funds and country: 2019*

	Gross domestic expenditure on R&D	Government	Business enterprise sector	Funds from abroad	Other national sources
Russia	100	66.3**	30.2	2.4	1.1
Brazil	100	49.7	47.5	...	2.8
Canada	100	32.9	41.0	9.9	16.3
China	100	20.2	76.6	0.4	...
France	100	32.4	56.1	7.8	3.7
Germany	100	27.8	66.0	5.8	0.3
India	100	63.2	36.8	...	...
Italy	100	32.7	54.6	10.5	2.1
Japan	100	14.6	79.1	0.6	5.8
South Korea	100	20.5	76.6	1.9	0.9
Taiwan	100	18.8	80.3	0.1	0.7
United Kingdom	100	25.9	54.8	13.7	5.6
United States	100	23.0	62.4	7.3	7.4

* Or nearest years for which data is available.

** Including federal budget appropriations, general university funds, and government sector institutions' funds (including own funds).

3.9. Percentage distribution of gross domestic expenditure on R&D by sector of performance and country: 2019*

	Gross domestic expenditure on R&D	Government sector	Business enterprise sector	Higher education sector	Private non-profit sector
Russia	100	28.3	60.7	10.6	0.4
Canada	100	7.0	51.4	41.2	0.4
China	100	15.2	77.4	7.4	...
France	100	12.5	65.4	20.5	1.6
Germany	100	13.5	68.9	17.6	...
India	100	56.1	36.8	7.1	...
Italy	100	12.4	63.3	22.8	1.5
Japan	100	7.8	79.4	11.6	1.3
South Korea	100	10.1	80.3	8.2	1.4
Taiwan	100	10.7	80.3	8.9	0.1
United Kingdom	100	6.6	67.6	23.6	2.2
United States	100	10.4	72.6	12.8	4.2

* Or nearest years for which data is available.

3.10. Gross domestic expenditure on R&D by S&T priority area and source of funds: 2019

(million roubles)

	Total	Government*	Of which federal budget appropriations
Gross domestic expenditure on R&D by S&T priority areas	804487.5	556716.9	456749.0
Of which:			
information and telecommunications systems	88471.6	56857.3	50186.0
industry of nanosystems	25003.8	20102.6	16168.4
life sciences	73939.1	60861.0	54230.6
rational use of natural resources	57107.5	26449.6	23269.9
energy effectiveness, energy saving, and nuclear power engineering	110366.7	80699.9	67809.6
transport and space systems	247266.6	179182.1	148545.4

* Including federal budget appropriations and government sector institutions' funds (including own funds).

3.11. Percentage distribution of gross domestic expenditure on R&D by S&T priority area and source of funds: 2019

* Including federal budget appropriations and government sector institutions' funds (including own funds).

** Funds of business enterprise sector institutions (including own funds).

3.12. Subsidies, grants, and other types of competitive R&D funding: 2019

	Total, <i>million roubles</i>	As a percentage of the total
Gross domestic expenditure on R&D – total	1134786.7	100
budget subsidies for institutional R&D funding	158592.9	14.0
budget subsidies for performing R&D	49636.8	4.4
grants from foundations for S&T and innovation	35204.4	3.1
other types of competitive funding	68930.6	6.1

3.13. Current expenditure on R&D by type of R&D

(million roubles)

	2000	2010	2017	2018	2019
Current expenditure on R&D	73873.3	489450.8	950257.0	960689.4	1060589.7
Basic research	9875.7	95881.4	141299.2	169175.0	181371.9
Applied research	12117.5	92010.7	172547.9	197209.3	213363.3
Development	51880.2	301558.8	636409.9	594305.2	665854.6

3.14. Percentage distribution of current expenditure on R&D by type of R&D

3.15. Average monthly salaries of R&D personnel

	2000	2010	2017	2018	2019
Average monthly salaries, roubles	2322.9	25043.5	48833.6	53272.0	57012.6
As a percentage of salaries:					
in the national economy (=100%)	104.5	119.5	124.7	121.8	119.1
in manufacturing (=100%)	98.2	131.3	126.8	130.8	130.0
in construction (=100%)	88.0	118.3	145.0	138.3	133.7

3.16. Tax incentives on R&D by type

(million roubles)

	2015	2016	2017	2018	2019
Tax expenditure on R&D – total	122800.1	139891.0	143133.1	144925.2	176883.4
VAT exemption	111953.9	128150.0	128925.2	128188.3	161831.2
R&D funded from budget and special foundations	82718.1	96199.2	95200.5	86585.6	104606.8
Sales of exclusive rights on R&D results	21976.3	24882.9	27767.7	34651.3	50369.4
R&D aimed at development/ improvement of new technologies and products (for selected types of economic activity)	7259.6	7067.9	5956.9	6951.4	6855.1

(continued)

	2015	2016	2017	2018	2019
Income tax reduction	8790.2	9552.2	12005.1	14158.8	13027.9
Accelerated depreciation of fixed assets for S&T activity	41.0	37.2	36.6	35.4	35.3
Accelerated R&D expenditure write-off	8749.2	9514.2	11968.5	14123.4	12992.6
Contributions to state foundations for S&T and innovation	–	0.8	–	–	–
Property tax exemption	2056.0	2188.9	2202.9	2578.1	2024.3
State research centres	2056.0	2188.9	2202.9	2578.1	2024.3

Sources: national statistical surveys on the structure of VAT calculation, on the tax base and the structure of income tax calculation for organisations, on the tax base and the structure of property tax calculation for organisations

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R&D OUTPUT

4.1. Articles in scientific journals indexed in international databases by country*

	Web of Science				Scopus			
	2009	Rank**	2019	Rank**	2009	Rank**	2019	Rank**
Russia	33 304	14	63 251	14	32 216	14	73 496	12
Brazil	35 399	13	69 298	13	36 975	13	67 744	14
Canada	58 636	7	85 819	7	57 309	7	81 379	9
China	129 741	2	495 209	1	215 820	2	540 174	1
France	66 288	6	84 545	8	68 389	6	82 359	8
Germany	90 919	4	131 199	4	92 766	4	124 854	5
India	43 381	11	103 818	5	52 075	9	133 681	4
Italy	53 913	8	84 451	9	54 462	8	83 012	7
Japan	78 250	5	93 787	6	89 645	5	94 836	6
South Korea	40 271	12	71 980	12	40 070	12	72 924	13
Taiwan	24 707	16	28 911	21	26 090	16	27 936	21
United Kingdom	102 560	3	155 058	3	100 544	3	146 465	3
United States	361 910	1	489 706	2	355 529	1	461 503	2

* Estimates as of September 4, 2020.

** In global ranking.

4.2. Country shares in the world total of articles in scientific journals indexed in international databases: 2019*

* Estimates as of September 4, 2020.

4.3. Main quality indicators of publications by Russian authors in scientific journals indexed in international databases*

Indicator	Web of Science		Scopus	
	2009	2019	2009	2019
Ratio of average citation level of publications by Russian authors to the world citation average, <i>times</i>	0.59	0.69	0.54	0.54
Share of citations of publications by Russian authors in the world citation total, <i>percentage</i>	0.99	1.73	1.01	2.04
Share of publications in Q1 journals in the total number of publications by Russian authors, <i>percentage</i>	20.8	25.2	21.9	17.9
Share of publications in Q1 journals in the world total of publications, <i>percentage</i>	43.9	41.5	46.0	46.4

* Calculations are based on Scopus SciVal and InCites Clarivate Analytics data as of September 4, 2020.

4.4. Publications by Russian authors in scientific journals indexed in international databases by field of science: 2019*

Field of science	Web of Science			Scopus		
	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*
Natural sciences						
Physical sciences	13656	7.06	4	17992	6.53	5
Chemical sciences	9808	3.60	8	17346	4.45	6
Earth and related environmental sciences	4445	2.61	15	12114	3.97	10
Biological sciences	6259	2.35	15	11006	2.54	14
Mathematics	4557	5.11	7	6787	4.87	7
Computer and information sciences	1037	1.15	24	3971	2.12	15
Interdisciplinary research	505	7.74	4	758	1.41	21

* Calculations are based on Scopus InCites Clarivate Analytics data as of September 4, 2020.

(continued)

Field of science	Web of Science			Scopus		
	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*
Engineering and technology						
Materials engineering	6046	3.43	9	12899	4.29	7
Chemical engineering	1384	3.04	10	5348	3.45	8
Mechanical engineering	2986	4.12	10	3716	2.74	11
Electrical engineering, electronic engineering, information engineering	1700	1.46	21	2956	2.26	13
Energy and environmental engineering	2237	2.08	15	2075	2.99	11
Medical engineering	122	0.62	34–35	1006	2.31	13
Civil engineering	204	0.60	38	825	1.45	17
Nano-technology	1135	2.47	12	472	2.71	9
Environmental biotechnology	474	1.61	18	239	1.22	21–22
Industrial biotechnology	142	1.46	21	79	1.06	24

(continued)

Field of science	Web of Science			Scopus		
	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*
Medical and health sciences						
Clinical medicine	2635	0.75	30	8477	1.86	19
Basic medicine	2580	1.39	22	6804	1.99	16
Health sciences	819	0.58	43	2235	1.52	18
Medical biotechnology	...	...	...	375	1.37	17
Agricultural and veterinary sciences						
Agriculture, forestry, and fisheries	740	1.65	19	2469	2.22	15
Veterinary science	28	0.27	57–58	862	1.43	21
Animal and dairy science	48	0.27	58	141	0.65	39
Agricultural biotechnologies	...	...	...	22	1.40	19–22
Social sciences						
Economics and business	1343	1.71	20	3124	2.82	13
Political science	594	2.52	10	3016	4.00	8
Sociology	856	2.20	11	2761	3.96	7

(continued)

Field of science	Web of Science			Scopus		
	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*	Number of articles by Russian authors	Russia's share in the world total of articles, <i>percentage</i>	Rank*
Education	840	1.93	12	1861	3.63	7
Psychology and cognitive sciences	812	1.57	17	1143	1.21	22
Law	519	2.90	9–10	1135	2.50	13
Social and economic geography	576	1.25	24	598	1.54	18
Media and communications	480	2.93	9	139	1.33	19
Humanities and the arts						
History and archaeology	2254	7.81	3	1786	7.52	3
Languages and literature	1379	4.53	4	1262	4.64	4
Philosophy, ethics, and religion	743	2.99	9	1017	4.79	4
Arts (arts, history of arts, etc.)	121	0.81	18–19	369	3.56	5

4.5. Patent applications and patent grants

	2000	2005	2010	2016	2017	2018	2019
Patent applications filed in the Russian Federation	28688	32254	42500	41587	36454	37957	35511
By Russian residents	23377	23644	28722	26795	22777	24926	23337
By non-residents	5311	8610	13778	14792	13677	13031	12174
Patent grants received in the Russian Federation	17592	23390	30322	33536	34254	35774	34008
By Russian residents	14444	19447	21627	21020	21037	20526	20113
By non-residents	3148	3943	8695	12516	13217	15248	13895
Patents in force in the Russian Federation	144325	123089	181904	230870	244321	256419	263688

4.6. Patent grants received in the Russian Federation by section of the International Patent Classification*

	2000	2010	2016	2017	2018	2019
Total	17592	30322	33536	34254	35774	34008
A. Human necessities	4347	8468	7344	7577	7647	7577
B. Performing operations; transporting	2905	4711	4689	5501	6216	6313
C. Chemistry; metallurgy	3332	5167	7894	5677	5362	5133
D. Textiles; paper	197	320	253	299	342	294
E. Fixed constructions; mining	1156	1977	1925	2087	2241	1888
F. Mechanical engineering; lighting; heating; weapons; blasting	2144	3062	3434	3972	4262	3744
G. Physics	2172	3734	4785	5736	6041	5649
H. Electricity	1339	2883	3212	3405	3663	3410

* Patents granted to resident and non-resident applicants.

4.7. Patent applications by country of origin*

	2000	2005	2010	2016	2017	2018	Rank**
Russia	24093	25948	32837	31833	27807	28700	12
Brazil	3782	4921	5737	7216	7505	6859	26
Canada	13951	20193	24219	24640	23927	24483	14
China	26445	97948	308327	1257425	1306080	1460244	1
France	45832	54309	65726	71509	71087	69120	6
Germany	134698	153659	173656	177175	176405	180086	5
India	2881	8031	14871	25853	28009	30036	11
Italy	20410	17578	27948	31187	31393	32286	10
Japan	490772	530009	468438	456550	460771	460369	3
South Korea	85783	162694	178654	233801	226801	232020	4
United Kingdom	46275	46920	50863	52902	53825	56216	7
United States	280386	383358	433297	522065	525467	515180	2

* Patent applications filed by residents in the country and abroad.

** In global ranking.

Sources: Rospatent Annual Reports; WIPO Statistics Database, October 2020.

4.8. Patent applications by country of origin and patent office: 2018

	Patent applications filed		
	total	of which	
		to the national patent office	abroad
Russia	28700	23337	5363
Brazil	6859	4980	1879
Canada	24483	4349	20134
China	1460244	1393815	66429
France	69120	24741	44379
Germany	180086	73333	106753
India	30036	16289	13747
Italy	32286	13323	18963
Japan	460369	253630	206739
South Korea	232020	162561	69459
United Kingdom	56216	18599	37617
United States	515180	285095	230085

Sources: Rospatent Annual Reports; WIPO Statistics Database, October 2020.

4.9. Development of advanced manufacturing technologies by type and degree of novelty: 2019

	Total	Of which technologies	
		new to the country	radically new
Advanced manufacturing technologies	1620	1403	217
Of which:			
Design and engineering	456	403	53
Fabrication, processing and assembling	510	447	63
Automated material handling	29	25	4
Automated inspection and/or testing equipment	159	98	61
Communications and control	316	295	21
Manufacturing information systems	81	73	8
Integrated management and control	69	62	7

4.10. Use of advanced manufacturing technologies by type and duration: 2019

	Total	Of which technologies used during the period of			
		less than 1 year	1–3 years	4–5 years	6 years and over
Advanced manufacturing technologies	262645	18638	49873	38441	155693
Of which:					
Design and engineering	41922	2902	9007	6056	23957
Fabrication, processing and assembling	81885	6373	13857	10814	50841
Automated material handling	2627	259	513	420	1435
Automated inspection and/or testing equipment	14077	1170	3428	2334	7145
Communications and control	108320	6690	19590	17188	64852
Manufacturing information systems	8776	804	2254	1087	4631
Integrated management and control	5038	440	1224	542	2832

4.11. Technology balance of payments by category of contracts: 2019

(million USD)

	Receipts from exports	Payments for imports	Balance of payments
Total	3520.1	4836.8	-1316.7
Patents	1.4	3.8	-2.4
Unpatented inventions	0.8	0.9	-0.1
Patent licenses	34.0	220.2	-186.3
Plant varieties	0.0	0.8	-0.8
Utility models	1.3	7.2	-5.9
Know-how	4.7	486.0	-481.3
Trademarks	4.1	580.5	-576.4
Industrial designs	0.1	4.1	-4.1
Engineering services	2588.2	2823.8	-235.6
Research and development	396.8	119.9	276.9
Others	488.9	589.7	-100.8

4.12. Percentage distribution of technology exports and imports in Russia by country group: 2019

Receipts from technology exports

Payments for technology imports

CIS countries

OECD countries

Other countries

| 5

INNOVATION

5.1 Main indicators of enterprises' innovation activity

	2010	2015	2017	2018	2019
Innovation activity of enterprises, <i>percentage</i> *	9.5	9.3	14.6	12.8	9.1
Innovation expenditure, <i>million roubles</i> **	411008.8	1211294.4	1416922.8	1484901.1	1954133.3
At constant 2010 prices	411008.8	790817.0	854546.0	806091.5	1021982.8
As a percentage of total sales	1.6	2.7	2.5	2.2	2.1
Sales of innovative goods and services, <i>million roubles</i>	1243712.5	3843428.7	4166998.7	4516276.4	4863381.9
At constant 2010 prices	1243712.5	2509256.8	2513116.6	2451699.9	2543476.7
As a percentage of total sales	4.8	8.4	7.2	6.5	5.3

* In tables 5.1 and 5.2, until 2017, this indicator was calculated based on the data on enterprises engaged in technological, organisational, and marketing innovation.

** Until 2019, this indicator was calculated based on the data on the total expenditure on technological, organisational, and marketing innovation.

5.2. Trends in innovation activity of enterprises

Percentage

* Here and below in this section, aggregate data on enterprises by type of economic activity: 2017–2019, OKVED2 codes 61, 62, 63; before 2017, OKVED (Rev. 1.1) codes 64, 72.

5.3. Innovation activity of enterprises: 2019

Percentage

- 1 – total
- 2 – industry
- 3 – mining and quarrying
- 4 – manufacturing

- 5 – high tech
- 6 – medium high tech
- 7 – medium low tech
- 8 – low tech
- 9 – electricity, gas, steam and air conditioning supply*

- 10 – water supply; sewerage, waste management and remediation activities**

- 11 – services
- 12 – transportation and storage
- 13 – telecommunications and IT industry
- 14 – human health and social work activities
- 15 – agriculture
- 16 – construction

* Here and below in this section, aggregate data on enterprises by type of economic activity with Section D codes of OKVED2.

** Here and below in this section, aggregate data on enterprises by type of economic activity with Section E codes of OKVED2.

5.4. Enterprises engaged in product and process innovation: 2017–2019

(as a percentage of all enterprises that have had completed innovation activities)

5.5. Innovation expenditure: 2019

	Total, million roubles	Of which, <i>percentage</i>			
		R&D	acquisition of machinery and equipment, other fixed assets	development and aquisition of computer and database software	aquisition of intellectual property rights*
Total	1954133.3	44.6	33.6	3.6	0.4
Industry	984315.5	34.0	38.8	2.4	0.6
Mining and quarrying	154656.0	54.6	18.7	2.4	0.3
Manufacturing	760211.3	31.9	39.2	2.6	0.7
High tech	151744.1	49.9	24.6	1.3	1.1
Medium high tech	140622.5	28.9	40.3	0.8	1.5
Medium high tech	377064.9	29.2	39.0	4.2	0.4
Low tech	90779.8	17.6	62.8	0.5	0.02
Electricity, gas, steam and air conditioning supply	52995.4	11.5	78.0	1.6	0.0

(continued)

	Total, million roubles	Of which, <i>percentage</i>			
		R&D	acquisition of machinery and equipment, other fixed assets	development and aquisition of computer and database software	aquisition of intellectual property rights*
Water supply; sewerage, waste management and remediation activities	16452.8	12.3	83.5	0.2	0.01
Services	909494.1	57.5	26.2	5.0	0.3
Transportation and storage	228822.7	16.3	78.4	0.6	0.03
Telecommunications and IT industry	100958.0	25.1	12.1	25.8	1.2
Human health and social work activities	17763.8	15.6	66.1	2.0	0.2
Agriculture	49393.2	24.6	56.2	0.1	0.03
Construction	10930.5	11.5	77.0	1.8	0.3

* Acquisition of patent rights (assignment), licenses for patents, industrial designs, utility models, plant varieties, intergrated circuit designs, etc.; patenting (registration) of intellectual property rights.

5.6. Innovation expenditure by source of funds: 2019

5.7. Intensity of innovation expenditure: 2019

(ratio of innovation expenditure to total sales)

Percentage

1 – total

2 – industry

3 – mining and quarrying

4 – manufacturing

5 – high tech

6 – medium high tech

7 – medium low tech

8 – low tech

9 – electricity, gas, steam and
air conditioning supply*

10 – water supply; sewerage, waste
management and remediation
activities**

11 – services

12 – transportation and storage

13 – telecommunications and IT industry

14 – human health and social work
activities

15 – agriculture

16 – construction

5.8. Sales of innovative goods and services: 2019

	Million roubles	As a percentage of total sales
Total	4863381.9	5.3
Industry	3871481.1	6.1
Mining and quarrying	663341.0	3.8
Manufacturing	2986615.5	7.7
High tech	444021.5	18.1
Medium high tech	879555.6	11.0
Medium low tech	1325218.4	6.2
Low tech	337820.0	4.6
Electricity, gas, steam and air conditioning supply	202922.3	3.4
Water supply; sewerage, waste management and remediation activities	18602.2	2.3
Services	892389.2	4.9
Transportation and storage	47469.6	0.5
Telecommunications and IT industry	200311.3	6.4
Human health and social work activities	13710.9	0.7
Agriculture	69559.2	2.3
Construction	29952.4	0.4

5.9. Exports of innovative goods and services: 2019

	Million roubles	As a percentage of total sales
Total	864329.5	17.8
Industry	779741.9	20.1
Mining and quarrying	210685.0	31.8
Manufacturing	568096.1	19.0
High tech	145598.8	32.8
Medium high tech	113884.6	12.9
Medium low tech	287680.5	21.7
Low tech	20932.2	6.2
Electricity, gas, steam and air conditioning supply	–	–
Water supply; sewerage, waste management and remediation activities	960.8	5.2
Services	81048.3	9.1
Transportation and storage	5042.7	10.6
Telecommunications and IT industry	31998.0	16.0
Human health and social work activities	2.3	0.02
Agriculture	361.3	0.5
Construction	3178.0	10.6

5.10. Enterprises that took part in joint R&D projects: 2019

(as a percentage of all enterprises engaged in innovative activity)

	Total	By type of partners		
		research organisations	higher education institutions	organisations within the same enterprise group
Total	18.2	9.3	5.8	6.3
Industry	17.6	7.9	5.1	6.4
Mining and quarrying	25.1	15.8	4.9	14.2
Manufacturing	18.4	8.0	5.6	6.7
High tech	30.8	13.8	9.6	12.1
Medium high tech	17.9	7.2	4.6	5.5
Medium low tech	19.3	9.8	7.3	8.4
Low tech	7.1	1.7	1.1	1.4
Electricity, gas, steam and air conditioning supply	11.8	5.7	2.8	2.4
Water supply; sewerage, waste management and remediation activities	7.7	3.0	1.2	1.8

(continued)

	Total	By type of partners		
		research organisations	higher education institutions	organisations within the same enterprise group
Services	20.6	11.8	7.2	6.7
Transportation and storage	17.6	4.9	3.5	5.5
Telecommunications and IT industry	12.6	1.1	1.9	4.2
Human health and social work activities	5.3	1.4	1.6	1.5
Agriculture	3.6	0.7	0.7	1.6
Construction	6.3	0.6	0.6	2.1

5.11. Enterprises that produced customised innovative goods and services: 2017–2019

(as a percentage of all enterprises that have had completed innovation activities)

5.12. Enterprises that plan to engage in innovative activity in 2020–2022 as a percentage of the total number of enterprises

5.13. Main indicators of enterprises' innovative activity by country: 2019* (percentage)

	Innovation activity of enterprises**	Innovation expenditure as a percentage of total sales***	Sales of innovative goods and services as a percentage of total sales
Russia	9.1	2.1	5.3
Austria	62.0	2.2	12.6
Belgium	68.1	2.3	13.6
Bulgaria	27.2	0.8	6.0
Denmark	51.5	3.3	–
France	57.7	2.0	9.9
Germany	63.7	3.1	14.0
Italy	53.8	1.4	12.4
Latvia	30.3	0.9	8.0
Netherlands	59.7	1.6	10.4
Poland	22.0	1.5	6.3
Sweden	54.2	3.8	8.7
United Kingdom	58.7	–	15.5

* Or nearest years for which data are available.

** For foreign countries, this indicator was calculated based on the data on enterprises engaged in technological, organisational, and marketing innovation.

*** For foreign countries, this indicator was calculated based on the data on the total expenditure on technological innovation.

|

6

**PUBLIC ATTITUDES TOWARDS
SCIENCE, TECHNOLOGY,
AND INNOVATION**

6.1. Participation in management of science, technology, and innovation*

(as a percentage of all respondents aged 18–65)

Should the population in any way participate in management of science, technology, and innovation?

* Sources here and below in this section: 2019, the results of a representative survey of the adult Russian population aged 18–65 conducted by HSE ISEK within the Russian Longitudinal Monitoring Survey (RLMS-HSE) with the support of the HSE Basic Research Programme (carried out in December 2018 – January 2019); 2014, HSE (2016) Science and Technology Indicators of the Russian Federation. Moscow : HSE.

6.2. Sources of information about science: 2019

(as a percentage of all respondents aged 18–65)

If you wanted to do your own research on any scientific topic, e.g. global warming, artificial intelligence, etc., which sources of information would you turn to first?

6.3. STI career attractiveness in comparison with other occupations: 2019*

(as a percentage of all respondents aged 18–65)

Would you be happy if your child decided to become a...?

* The share of respondents who 'would be happy' over their child's choice.

6.4. Opinions about scientists: 2019*

(as a percentage of all respondents aged 18–65)

Do you agree or disagree with the following statements on the job of a scientist?

* The share of respondents who 'completely agree' or 'mostly agree'.

Technical Notes

Bibliometric indicators are calculated on the basis of Web of Science Core Collection (SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI) and Scopus, as well as Scopus SciVal and InCites Clarivate Analytics. An article belongs to a country if it is listed in the affiliated address of an author or one of the co-authors.

Business process innovation is a new or improved business process that differs significantly from the firm's previous business processes and that has been brought into use by the firm.

Competitive research funding (programme funding) – funds received by the organisation, which came first according to the decision of a competition commission after summarising the results of a competition for scientific, technical programmes, innovation and other R&D-related projects, based on the best R&D project implementation conditions presented by this organisation in comparison with other participants.

Construction includes consolidated data on enterprises by types of economic activities: 2019, according to Section F codes of the Russian Classification of Economic Activities (Rev. 2) (OKVED2); 2017-2018, codes 43.91 and 43.99; before 2017, according to OKVED (Rev 1.1): codes 45.21.7, 45.22, and 45.25.

Federal budget appropriations on civil S&T – federal budget funds allocated for civil purpose basic and applied scientific research.

Grants are cash and other assets provided irrevocably and free of charge by persons and legal entities, including foreign citizens and foreign legal entities and international organisations which have the right to provide grants to the Russian Federation in accordance with the procedures laid down by the Government of the Russian Federation, to realise specific S&T programmes and projects, innovation projects, to conduct specific research under the conditions attached by grant-makers.

Gross domestic expenditure on R&D – actual expenditure on research and development performed by organisations during the reference year irrespective of financing sources, expressed in a monetary form.

Innovation activity of enterprises is a ratio of innovation-active enterprises to the total number of enterprises surveyed in the reporting year. The indicator's methodology is approved by the Order of Rosstat no. 818 of December 27, 2019. Changes in 2017 data are due to recalculation of the indicator according to this methodology.

Innovation expenditure is the actual expenditure in monetary form, connected with the implementation of different types of innovative activity performed within an organisation (industry, region, or country). Innovation expenditure includes current expenditure and capital expenditure.

Innovative activities are activities related to transformation of ideas (usually, R&D results or other S&T achievements) into technologically new or improved products or services that are significantly different from those produced before and intended to be introduced on the market; into technologically new or improved business that are significantly different from the corresponding business services that have been used before.

Innovative goods and services are products (goods and services) that are new or have undergone technological (and/or biological for agricultural enterprises) modification in the last three years.

Number of personnel in full-time equivalent is an indicator which reflects the sum of timeshares actually spent by R&D personnel on R&D activities and is measured in person-years.

Product innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market.

R&D personnel are professionals whose creative activities, performed systematically, are aimed at the advancement of scientific knowledge or search for new areas of its application, as well as direct services related to performance of R&D.

Researchers are professionals engaged in R&D and direct creators of new knowledge, products, processes, methods, and systems, as well as managers of these activities. Researchers usually have higher education degrees, university or equivalent.

Services includes consolidated data on enterprises by types of economic activities according to Section H and Q codes of the Russian Classification of Economic Activities (Rev. 2) (OKVED2): 58, 61, 62, 63, 69, 70, 71, 72, 73, 74.

Tax incentives (according to the 'Main Tax Policy Trends for 2015 and the 2016–2017 Planning Period' approved by the Government of the Russian Federation on July 1, 2014) are recognised as income shortfalls of the Russian Federation budgetary system due to application of tax benefits and other instruments (preferences) established by Russian laws on taxation and duties.

Technological innovation is the final result of innovative activity presented in a technologically new or improved good or service introduced on a market, a technologically new or improved process or technique of service production (transfer) used in real life.

Technology balance of payments registers the volume of commercial transactions related to international technology and other intangible assets transfers (exports and imports).

Science. Technology. Innovation

Pocket Data Book

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National Research University Higher School of Economics
Institute for Statistical Studies and Economics of Knowledge
20 Myasnitskaya st., Moscow, 101000, Russia. Tel.: +7 (495) 621-28-73

issek.hse.ru
issek@hse.ru