



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



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

Moscow 2020

УДК 001(083.41)(470+571)
ББК 72(2Рос)я2
S40

Editorial Board: Timur Bronitskiy, Leonid Gokhberg, Yaroslav Kuzminov,
and Marina Sabelnikova

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

With contributions by Irina Varzanovtseva

Science. Technology. Innovation : Pocket Data Book / L. Gokhberg (ed.), K. Ditkovskiy,
S40 E. Evnevich, et al.; National Research University Higher School of Economics. – Moscow : HSE,
2020. – 88 p. – 150 copies. – ISBN 978-5-7598-2159-5 (pbk).

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, the presented data specify those published earlier.

УДК 001(083.41)(470+571)
ББК 72(2Рос)я2

ISBN 978-5-7598-2159-5

© National Research University Higher School
of Economics, 2020
Reference is mandatory in case of reproduction

Contents

Infographics	9
1. Institutions	15
1.1. R&D institutions by type	16
1.2. R&D institutions by sector of performance	17
1.3. R&D institutions by ownership	18
2. R&D Personnel	19
2.1. R&D personnel	20
2.2. R&D personnel by occupation	21
2.3. Percentage distribution of R&D personnel by occupation	22
2.4. R&D personnel by sector of performance	23
2.5. Flows of R&D personnel	24
2.6. R&D personnel by country.....	25
2.7. R&D personnel per 10 000 employment by country: 2018.....	26
2.8. Researchers by sector of performance	27

2.9. Researchers with scientific degrees	27
2.10. Researchers with scientific degrees as a percentage of the total number of researchers.....	28
2.11. Researchers by field of S&T: 2018	29
2.12. Percentage distribution of researchers by age: 2018.....	30
2.13. Researchers by country	31
2.14. Researchers per 10 000 employment by country: 2018.....	32
3. R&D Funding.....	33
3.1. Gross domestic expenditure on R&D.....	34
3.2. Growth rates of gross domestic expenditure on R&D and gross domestic product	34
3.3. Gross domestic expenditure on R&D by country	35
3.4. Gross domestic expenditure on R&D as a percentage of GDP by country.....	36
3.5. Federal budget appropriations on civil S&T	37
3.6. Government budget appropriations on R&D by country	38
3.7. Gross domestic expenditure on R&D by source of funds	39

3.8. Percentage distribution of gross domestic expenditure on R&D by source of funds and country: 2018	40
3.9. Percentage distribution of gross domestic expenditure on R&D by sector of performance and country: 2018	41
3.10. Gross domestic expenditure on R&D by priority S&T areas: 2018	42
3.11. Percentage distribution of gross domestic expenditure on R&D by priority S&T areas and source of funds: 2018	43
3.12. Subsidies, grants and other types of competitive R&D funding: 2018	44
3.13. Intramural current expenditure on R&D by type	44
3.14. Percentage distribution of intramural current expenditure on R&D by type	45
3.15. Average monthly salaries of R&D personnel.....	46
3.16. Tax incentives on R&D by type	47
4. R&D Output	49
4.1. Articles in scientific journals indexed in international databases by country	50

4.2. Country shares in the world total of articles in scientific journals indexed in international databases: 2018	51
4.3. Main quality indicators of publications by Russian authors in scientific journals indexed in international databases	52
4.4. Publications by Russian authors in scientific journals indexed in international databases by field of science: 2018	53
4.5. Patent applications and patent grants	57
4.6. Patent grants in the Russian Federation by section of the International Patent Classification	58
4.7. Patent applications by country of applicant's origin	59
4.8. Patent applications by country of applicant's origin: 2018.....	60
4.9. Development of advanced manufacturing technologies by type and degree of novelty: 2018	61
4.10. Use of advanced manufacturing technologies by type and duration: 2018	62
4.11. Technology balance of payments by category of contracts: 2018	63
4.12. Percentage distribution of technology exports and imports in Russia by country groups: 2018.....	64

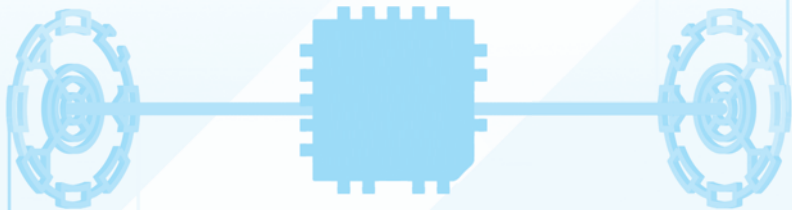
5. Innovation	65
5.1. Main indicators of enterprises' innovative activity	66
5.2. Expenditure on technological innovation: 2018.....	67
5.3. Expenditure on technological innovation by source of funds: 2018.....	69
5.4. Intensity of expenditure on technological innovation: 2018.....	70
5.5. Intensity of expenditure on technological innovation by country: 2018.....	71
5.6. Sales of innovative goods and services: 2018	72
5.7. Share of innovative goods and services in total sales by country: 2018.....	73
5.8. Share of technologically new or significantly improved goods and services in total sales: 2018	74
5.9. Innovative goods and services exports: 2018	75
5.10. Percentage distribution of enterprises taking part in joint R&D projects by type of partners: 2018	76
5.11. Effects of innovative activity: 2016–2018	78

6. Public Attitudes towards Science, Technology and Innovation	79
6.1. Consumption of technological innovation: 2019	80
6.2. Sources of information about new goods and services: 2019	81
6.3. Interest in science and technology news: 2019.....	82
6.4. Population assessment of level of awareness about science and technology: 2019.....	83
Technical Notes.....	84

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.

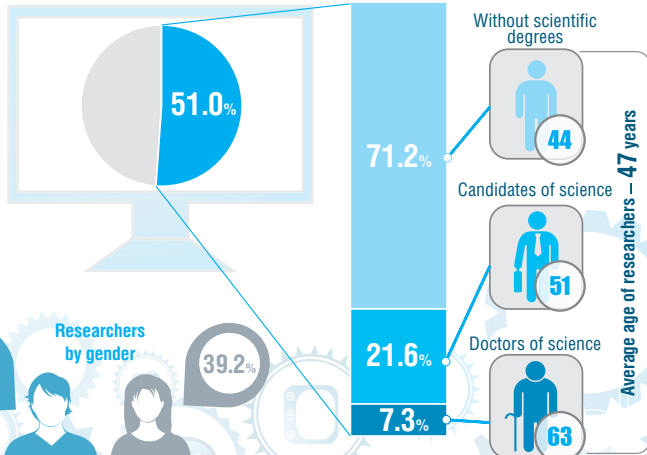


Infographics

R&D personnel: 2018

R&D personnel
Total – 682.6 thousand persons

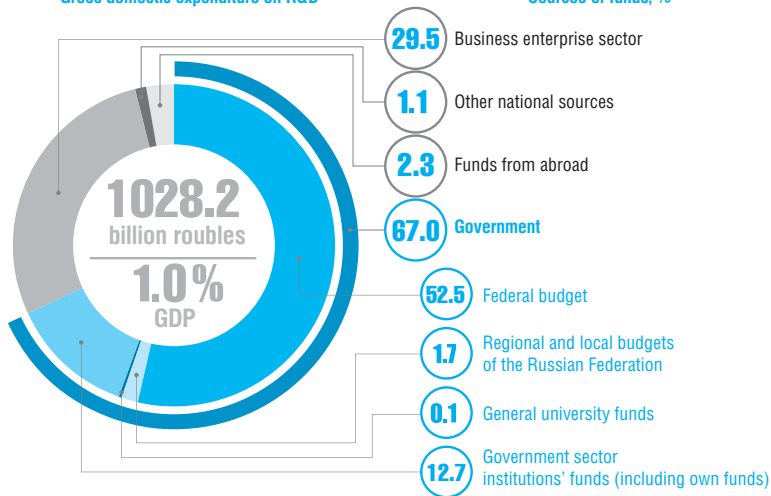
Researchers
Total – 347.8 thousand persons



R&D funding: 2018

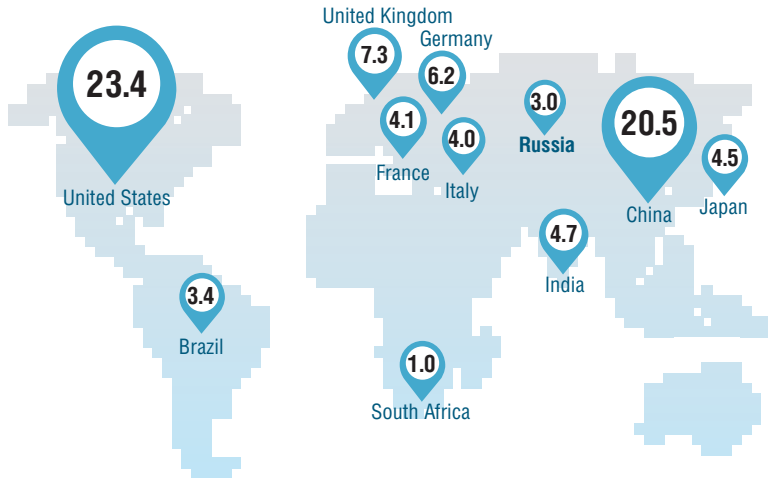
Gross domestic expenditure on R&D

Sources of funds, %

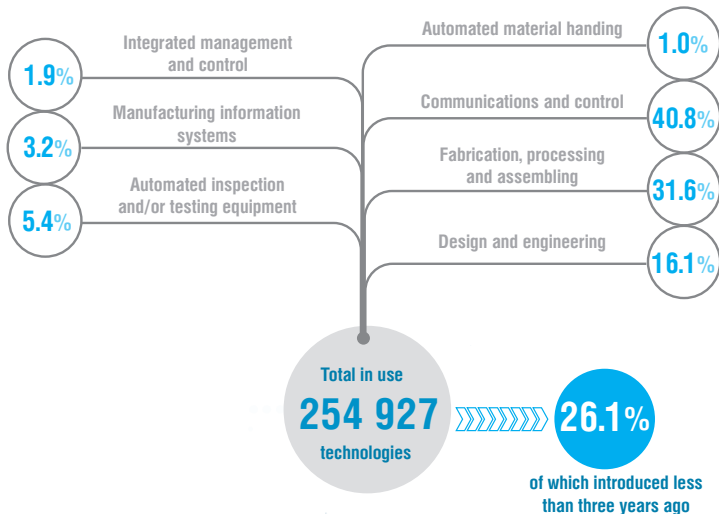


Country shares in the world total of articles in scientific journals indexed in Web of Science: 2018

(percentage)



Use of advanced manufacturing technologies: 2018



Development of innovation: 2018



Industry



Services



Agriculture



Construction





Institutions

1.1. R&D institutions by type

	2000	2010	2016	2017	2018
Total	4099	3492	4032	3944	3950
Research institutes	2686	1840	1673	1577	1574
Design organisations	318	362	304	273	254
Construction project and exploration organisations	85	36	26	23	20
Experimental enterprises	33	47	62	63	49
Higher education institutions	390	517	979*	970	917
Industrial enterprises	284	238	363	380	419
Others	303	452	625	658	717

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

1.2. R&D institutions by sector of performance

	2000	2010	2016	2017	2018
Total	4099	3492	4032	3944	3950
Sectors of performance:					
government	1247	1400	1546	1493	1511
business enterprise	2278	1405	1326	1292	1304
higher education	526	617	1064	1038	998
private non-profit	48	70	96	121	137

1.3. R&D institutions by ownership

	2000	2010	2016	2017	2018
Total	4099	3492	4032	3944	3950
Ownership:					
public	2938	2610	2592	2520	2510
private	388	470	865	875	880
joint	635	304	326	296	304
of state corporations	...	6	92	106	113
foreign and joint (with both Russian and foreign participation)	64	56	92	85	88
others	74	46	65	62	55



R&D Personnel

2.1. R&D personnel

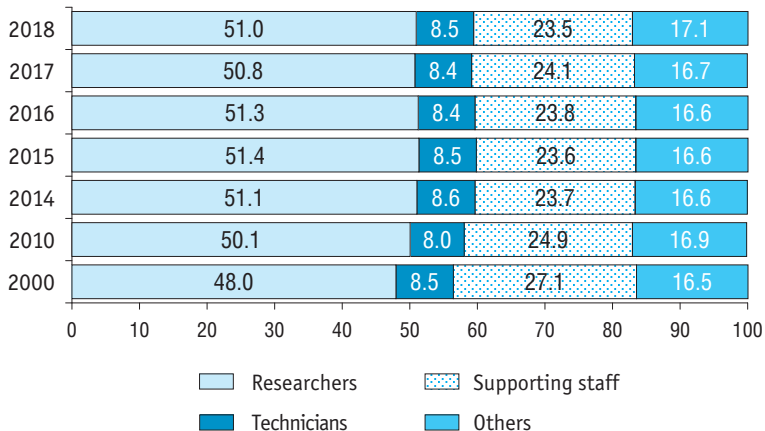
(headcount)

	2000	2010	2016	2017	2018
Total	887729	736540	722291	707887	682580
Research institutes	718434	435304	427158	407962	394402
Design organisations	56488	157146	133742	125272	115565
Construction project and exploration organisations	6811	6324	1801	1537	1296
Experimental enterprises	6145	1558	2996	6030	5747
Higher education institutions	31110	46776	59124	56571	58573
Industrial enterprises	54721	51807	50740	59421	52977
Others	14020	37625	46730	51094	54020

2.2. R&D personnel by occupation (headcount)

	2000	2010	2016	2017	2018
Total	887729	736540	722291	707887	682580
Researchers	425954	368915	370379	359793	347854
Technicians	75184	59276	60441	59690	57722
Supporting staff	240506	183713	171915	170347	160591
Others	146085	124636	119556	118057	116413

2.3. Percentage distribution of R&D personnel by occupation



2.4. R&D personnel by sector of performance (headcount)

	2000	2010	2016	2017	2018
Total	887729	736540	722291	707887	682580
Sectors of performance:					
government	255850	259007	269056	268080	270357
business enterprise	590646	423112	388385	377150	347080
higher education	40787	53290	63046	59729	64073
private non-profit	446	1131	1804	2928	1070

2.5. Flows of R&D personnel

(headcount)

	Inflow – total	Of which		Outflow – total	Of which	
		graduates from higher education institutions	from other research institutes		at own initiative	due to staff reduction
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	54550	11075	13210	93112	59214	2015
2015	100290	11662	14026	98643	58285	4238
2017	92300	9985	12539	98797	57974	4327

2.6. R&D personnel by country

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

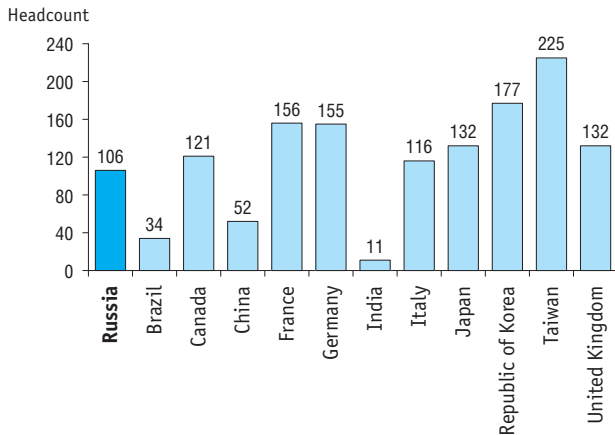
	2000	2010	2018*	Rank**
Russia	1007.3	840.0	758.5	4
Brazil	133.0	243.6	316.5	10
Canada	167.9	233.1	223.1	13
China	922.1	2553.8	4033.6	1
France	327.5	397.8	434.7	8
Germany	484.7	548.7	686.3	5
India	318.4	441.1	528.2	6
Italy	150.1	225.6	291.5	11
Japan	896.8	877.9	890.7	3
Republic of Korea	138.1	335.2	471.2	7
Taiwan	104.6	211.4	255.9	12
United Kingdom	288.6	350.8	424.5	9
United States***	985.0	1200.5	1371.3	2

* Or nearest years for which data is available.

** In the global ranking.

*** The number of researchers in full-time equivalent.

2.7. R&D personnel per 10 000 employment by country: 2018*



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

2.8. Researchers by sector of performance

(headcount)

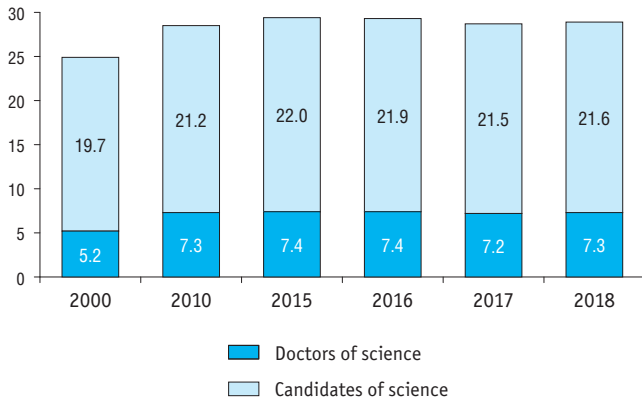
	2000	2010	2016	2017	2018
Total	425954	368915	370379	359793	347854
Sectors of performance:					
government	129725	131734	134225	130081	131366
business enterprise	267640	197785	190378	186347	171205
higher education	28325	38640	44994	42113	44489
private non-profit	264	756	782	1252	794

2.9. Researchers with scientific degrees

(headcount)

	2000	2010	2016	2017	2018
Researchers with scientific degrees	105911	105114	108388	103327	100330
Doctors of science	21949	26789	27430	26076	25288
Candidates of science	83962	78325	80958	77251	75042

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



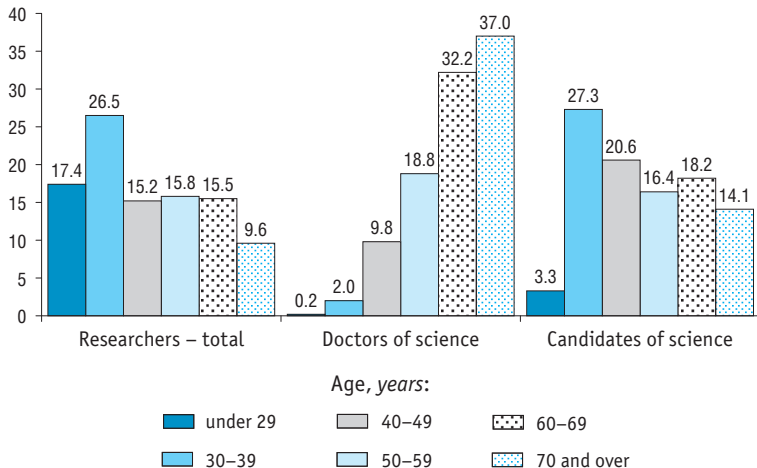
2.11. Researchers by field of S&T: 2018

(headcount)

	Researchers	Of whom	
		doctors of science	candidates of science
Total	347854	25288	75042
Natural sciences	78661	11302	30804
Engineering and technology	214233	4259	19816
Medical and health sciences*	14327	3365	5947
Agricultural and veterinary sciences	9575	1243	3940
Social sciences	19046	2862	8970
Humanities and the arts	12012	2257	5565

* Including psychophysiology.

2.12. Percentage distribution of researchers by age: 2018



2.13. Researchers by country

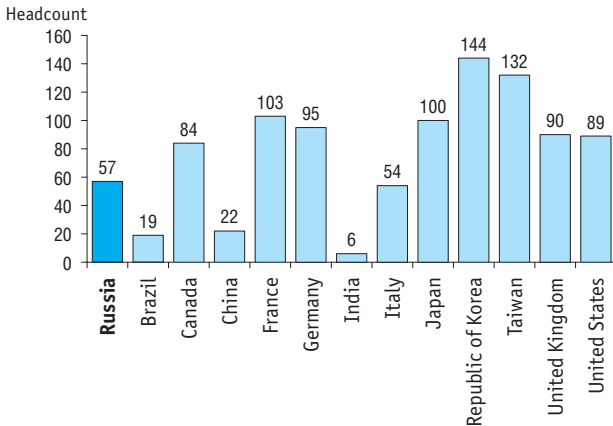
(thousand person-years; in full-time equivalent)

	2000	2010	2018*	Rank**
Russia	506.4	442.1	405.8	5
Brazil	73.9	134.3	180.0	10
Canada	107.9	158.7	155.1	11
China	695.1	1210.8	1740.4	1
France	172.1	243.5	288.6	8
Germany	257.9	328.0	419.6	4
India	115.9	192.8	283.0	9
Italy	66.1	103.4	136.2	13
Japan	647.6	656.0	676.3	3
Republic of Korea	108.4	264.1	383.1	6
Taiwan	55.5	128.3	150.4	12
United Kingdom	170.6	256.6	289.7	7
United States	985.0	1200.5	1371.3	2

* Or nearest years for which data is available.

** In the global ranking.

2.14. Researchers per 10 000 employment by country: 2018*



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



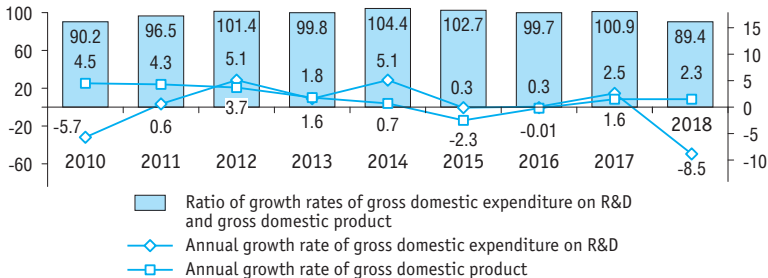
R&D Funding

3.1. Gross domestic expenditure on R&D (thousand roubles)

	2010	2016	2017	2018
Gross domestic expenditure on R&D:				
at current prices	523377233.9	943815219.6	1019152437.1	1028247644.8
at constant 2010 prices	523377233.9	593221382.5	607759817.0	555929738.8

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

Percentage



* Calculated in constant prices.

3.3. Gross domestic expenditure on R&D by country

(million current USD PPPs)

	2000	2010	2018*	Rank**
Russia	10726.9	33083.3	41871.5	9
Brazil	15823.9	32513.4	39903.5	10
Canada	16745.3	24893.6	27682.7	13
China	33080.4	213485.6	495980.9	2
France	33274.8	50858.6	64672.1	6
Germany	53892.7	86962.9	132004.4	4
India	15978.0	43674.8	49746.1	7
Italy	15473.8	25381.7	33542.9	12
Japan	98918.3	140565.6	170900.7	3
Republic of Korea	18533.0	52152.9	90979.6	5
Taiwan	9219.1	25105.5	39296.0	11
United Kingdom	25149.2	37536.7	49345.3	8
United States	269513.0	410093.0	543249.0	1

* Or nearest years for which data is available.

** In the global ranking.

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

	2000	2010	2018*
Russia	1.05	1.13	0.99
Brazil	1.00	1.16	1.27
Canada	1.86	1.83	1.55
China	0.89	1.71	2.15
France	2.09	2.18	2.19
Germany	2.40	2.71	3.04
India	0.77	0.82	0.62
Italy	1.01	1.22	1.35
Japan	2.91	3.14	3.21
Republic of Korea	2.18	3.47	4.55
Taiwan	1.91	2.81	3.30
United Kingdom	1.63	1.66	1.66
United States	2.63	2.74	2.79

* Or nearest years for which data is available.

3.5. Federal budget appropriations on civil S&T*

	2010	2016	2017	2018	2019**
Federal budget appropriations on civil S&T, million roubles	237644.0	402722.3	377882.2	420472.3	422092.2
Basic research	82172.0	105247.6	116977.6	149550.0	178349.3
Applied research	155472.0	297474.7	260904.6	270922.3	243742.9
As a percentage:					
of GDP	0.51	0.47	0.41	0.40	...
of total federal budget appropriations	2.35	2.45	2.30	2.52	2.77

* The source of 2010, 2016–2018 data are 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 November 29, 2018 no. 459-FL "On Federal Budget for 2019 and the 2020 and 2021 Planning Period" in the wording of Federal Law of July 18, 2019 no. 175-FL "On Amendments to the Federal Law 'On Federal Budget for 2019 and the 2020 and 2021 Planning Period'".

3.6. Government budget appropriations on R&D by country

(million current USD PPPs)

	2000	2010	2018*
Russia**	4784.6	26076.7	27965.1
Brazil***	8555.9	11570.2	13393.3
Canada	4589.6	8477.4	8189.3
China***	11051.4	51275.2	98244.6
France	14880.1	19141.6	20085.2
Germany	17234.0	28587.1	41032.0
Italy	9508.5	12348.8	12627.0
Japan	21227.8	32140.4	37244.3
Republic of Korea	5017.8	16293.9	22519.2
Taiwan	2978.7	7042.4	8217.2
United Kingdom	9492.2	13315.8	15700.2
United States	72681.0	119382.0	130541.0

* 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	2016	2017	2018
Gross domestic expenditure on R&D	76697.1	523377.2	943815.2	1019152.4	1028247.6
Government*	42035.7	368191.8	643401.0	674344.3	689270.6
Of which federal budget appropriations	29639.3	287057.5	506894.8	536387.3	539896.7
Business enterprise sector	25208.4	133499.0	265277.2	307459.0	303219.2
Higher education sector	213.0	2436.6	8210.5	7901.3	8841.5
Private non-profit sector	67.6	682.4	1537.1	2645.2	2761.1
Funds from abroad	9172.4	18567.5	25389.3	26802.6	24155.3

* Including federal budget appropriations, general university funds and government sector institutions' funds (e.g. own funds of R&D-performing institutions).

3.8. Percentage distribution of gross domestic expenditure on R&D by source of funds and country: 2018*

	Gross domestic expenditure on R&D	Government	Business enterprise sector	Funds from abroad	Other national sources
Russia	100	67.0**	29.5	2.3	1.1
Brazil	100	33.6	45.0	...	2.6
Canada	100	31.7	41.2	10.9	16.2
China	100	19.8	76.5	0.6	...
France	100	32.8	55.6	7.7	3.9
Germany	100	27.7	66.2	5.8	0.3
Italy	100	35.2	52.1	9.8	2.9
Japan	100	15.0	78.3	0.6	6.1
Republic of Korea	100	21.6	76.2	1.3	0.9
Taiwan	100	20.0	79.0	0.1	0.9
United Kingdom	100	26.3	51.8	15.6	6.4
United States	100	22.8	63.6	6.2	7.5

* Or nearest years for which data is available.

** Including federal budget appropriations, general university funds and government sector institutions' funds (e.g. own funds of R&D-performing institutions).

3.9. Percentage distribution of gross domestic expenditure on R&D by sector of performance and country: 2018*

	Gross domestic expenditure on R&D	Government sector	Business enterprise sector	Higher education sector	Private non-profit sector
Russia	100	34.4	55.6	9.7	0.3
Canada	100	6.6	52.0	40.9	0.4
China	100	15.2	77.6	7.2	...
France	100	12.7	65.0	20.7	1.7
Germany	100	13.5	69.1	17.4	...
India	100	52.5	43.6	3.9	...
Italy	100	12.7	61.4	24.2	1.7
Japan	100	7.8	78.8	12.0	1.4
Republic of Korea	100	10.7	79.4	8.5	1.4
Taiwan	100	12.1	78.7	8.9	0.2
United Kingdom	100	6.5	67.6	23.7	2.2
United States	100	9.7	73.1	13.0	4.1

* Or nearest years for which data is available.

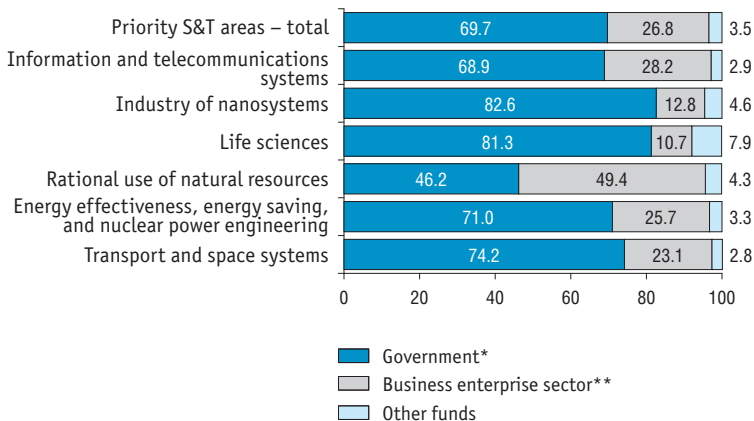
3.10. Gross domestic expenditure on R&D by priority S&T areas: 2018

(million roubles)

	Total	Government*	Of which federal budget appropriations
Gross domestic expenditure on R&D by priority S&T areas	717541.1	499834.7	406395.2
Information and telecommunications systems	76116.1	52470.8	43344.8
Industry of nanosystems	25417.5	20993.7	17433.4
Life sciences	61911.6	50355.5	44194.2
Rational use of natural resources	52376.0	24212.3	21435.1
Energy effectiveness, energy saving, and nuclear power engineering	99915.7	70984.3	55520.2
Transport and space systems	227725.7	168909.5	140556.5

* Including federal budget appropriations and government sector institutions' funds (e.g. own funds of R&D-performing institutions).

3.11. Percentage distribution of gross domestic expenditure on R&D by priority S&T areas and source of funds: 2018



* Including federal budget appropriations and government sector institutions' funds (e.g. own funds of R&D-performing institutions).

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

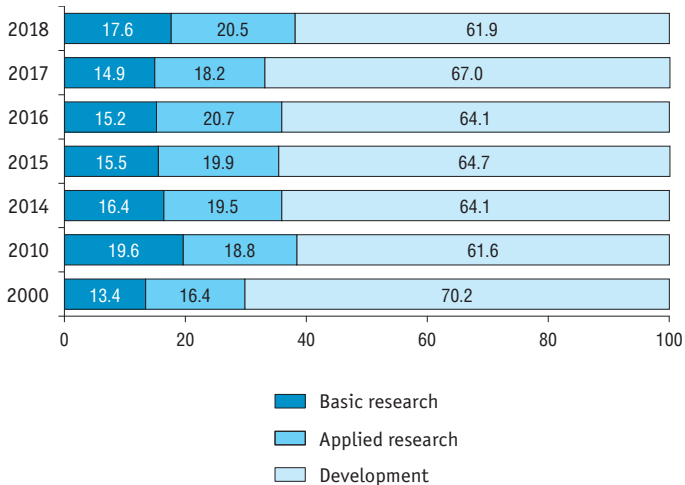
3.12. Subsidies, grants and other types of competitive R&D funding: 2018

	Total, <i>million roubles</i>	As a percentage of the total
Gross domestic expenditure on R&D – total	1028247.6	100
Of which:		
budget subsidies for institutional R&D funding	68277.5	6.6
budget subsidies for performing R&D	46677.6	4.5
grants from foundations for S&T and innovation	30024.5	2.9
other types of competitive funding	65041.9	6.3

3.13. Intramural current expenditure on R&D by type (*million roubles*)

	2000	2010	2016	2017	2018
Intramural current expenditure on R&D	73873.3	489450.8	873778.7	950257.0	960689.4
Basic research	9875.7	95881.4	132565.1	141299.2	169175.0
Applied research	12117.5	92010.7	181157.9	172547.9	197209.3
Development	51880.2	301558.8	560055.7	636409.9	594305.2

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



3.15. Average monthly salaries of R&D personnel

	2000	2010	2016	2017	2018
Average monthly salaries, roubles	2322.9	25043.5	43539.5	48833.6	53272.0
As a percentage of that:					
in the national economy (=100%)	104.5	119.5	118.6	124.7	121.8
in manufacturing (=100%)	98.2	131.3	125.9	126.8	130.8
in construction (=100%)	88.0	118.3	134.7	145.0	138.3

3.16. Tax incentives on R&D by type

(million roubles)

	2014	2015	2016	2017	2018
Tax expenditure on R&D – total	116585.6	122800.1	139891.0	143133.1	144925.2
VAT exemption	105469.1	111953.9	128150.0	128925.2	128188.3
R&D funded from budget and special foundations	81656.7	82718.1	96199.2	95200.5	86585.6
Sales of exclusive rights on R&D results	18572.8	21976.3	24882.9	27767.7	34651.3
R&D aimed at development/ improvement of new technologies and products (for selected types of economic activity)	5239.6	7259.6	7067.9	5956.9	6951.4

(continued)

	2014	2015	2016	2017	2018
Income tax reduction	8873.1	8790.2	9552.2	12005.1	14158.8
Accelerated depreciation of fixed assets for S&T activity	51.6	41.0	37.2	36.6	35.4
Accelerated R&D expenditure write-off	8821.5	8749.2	9514.2	11968.5	14123.4
Contributions to state foundations for S&T and innovation	–	–	0.8	–	–
Property tax exemption	2243.4	2056.0	2188.9	2202.9	2578.1
State research centres	2243.4	2056.0	2188.9	2202.9	2578.1

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.



R&D Output

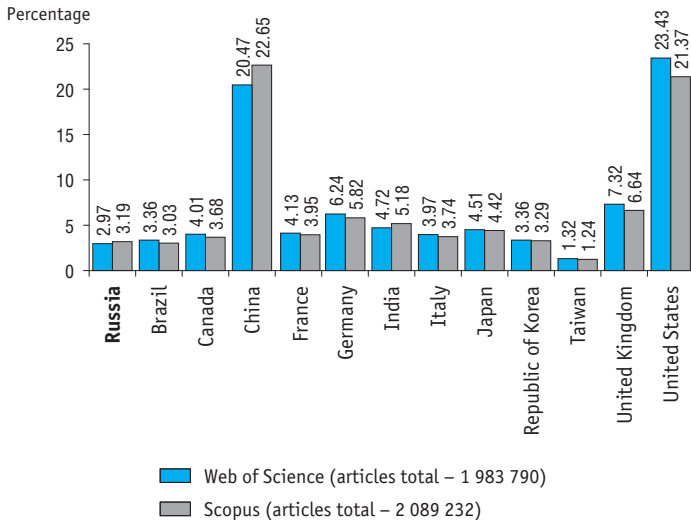
4.1. Articles in scientific journals indexed in international databases by country*

	Web of Science				Scopus			
	2008	Rank**	2018	Rank**	2008	Rank**	2018	Rank**
Russia	30914	14	58918	14	30892	14	66602	13
Brazil	32159	13	63896	13	33389	13	63399	14
Canada	55381	7	79624	8	53389	7	76787	9
China	105687	2	406152	2	194378	2	473278	1
France	63450	6	81937	7	64321	6	82621	7
Germany	85915	4	123699	4	88282	4	121499	4
India	40190	10	93636	5	45655	9	108290	5
Italy	49918	8	78785	9	50454	8	78197	8
Japan	77672	5	89472	6	87337	5	92355	6
Republic of Korea	36933	12	66751	12	35814	12	68658	12
Taiwan	22966	16	26090	21	24103	16	26004	21
United Kingdom	96588	3	145241	3	95839	3	138621	3
United States	345871	1	464789	1	337694	1	446415	2

* Here and below as of November 25, 2019.

** In the global ranking.

4.2. Country shares in the world total of articles in scientific journals indexed in international databases: 2018



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

Indicator	Web of Science		Scopus	
	2008	2018	2008	2018
Ratio of average citation level of publications by Russian authors to the world citation average, <i>times</i>	0.64	0.72	0.53	0.54
Share of citations of publications by Russian authors in the world citation total, <i>percentage</i>	1.09	1.86	1.01	1.95
Share of publications in Q1 journals in the total number of publications by Russian authors, <i>percentage</i>	20.1	24.7	21.3	15.7
Share of publications in Q1 journals in the world total of publications, <i>percentage</i>	43.7	42.1	37.7	41.5

4.4. Publications by Russian authors in scientific journals indexed in international databases by field of science: 2018

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	13141	7.01	6	19238	6.35	5
Mathematics	4401	5.34	6	6644	4.95	7
Chemical sciences	8899	3.66	9	13086	4.14	6
Biological sciences	5635	2.33	15	9551	2.34	15
Earth and related environmental sciences	4092	2.74	14	10367	3.56	11
Computer and information sciences	846	1.14	27	3141	2.13	15
Interdisciplinary research	827	12.65	2	464	1.34	21

* In the global ranking.

(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	5339	3.52	9	12011	4.55	7
Mechanical engineering	2804	4.48	9	3784	2.94	10
Energy and environmental engineering	1859	2.05	15	524	1.08	27
Electrical engineering, electronic engineering, information engineering	1594	1.64	18	2456	2.10	14
Chemical engineering	1169	3.02	11	5340	3.72	8
Nano-technology	1020	2.38	13	...	...	...
Civil engineering	280	0.86	29	633	1.34	21
Environmental biotechnology	505	1.85	16	...	...	...
Industrial biotechnology	123	1.46	21	...	...	...
Medical engineering	122	0.63	33	562	2.01	17

(continued)

Field of science	Web of Science			Scopus		
	Number of articles by Russian authors	Russia's share in the world total of articles, percentage	Rank*	Number of articles by Russian authors	Russia's share in the world total of articles, percentage	Rank*
Medical and health sciences						
Clinical medicine	2408	0.74	30	8437	1.66	19
Basic medicine	2394	1.37	22	4118	1.77	17
Health sciences	521	0.41	49	1633	1.39	20
Medical biotechnology	...	...	...	366	1.73	17
Agricultural and veterinary sciences						
Agriculture, forestry, and fisheries	682	1.73	18	2526	1.66	19
Veterinary science	53	0.34	51–52	93	0.47	46
Animal and dairy science	51	0.58	40–41	668	1.22	29
Humanities and the arts						
History and archaeology	1922	7.60	3	1106	5.16	6
Languages and literature	975	3.36	9	818	3.44	7
Philosophy, ethics and religion	680	2.97	9	908	5.08	3
Arts (arts, history of arts, etc.)	164	1.11	13	197	2.01	9

(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*
Social sciences						
Economics and business	1186	1.68	19	3277	3.69	9
Education	963	2.48	10	1593	3.71	6
Psychology and cognitive sciences	839	1.85	16	784	1.15	22
Sociology	629	1.85	13	2249	3.69	7
Political science	597	2.69	10	639	3.85	6
Social and economic geography	594	1.44	22	531	1.61	18
Law	346	1.97	11	334	2.02	12
Media and communications	287	1.95	12	84	0.91	28

4.5. Patent applications and patent grants

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

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

	2000	2005	2010	2016	2017	2018
Total	17592	23390	30322	33536	34254	35774
A. Human necessities	4347	6703	8468	7344	7577	7647
B. Performing operations; transporting	2905	3669	4711	4689	5501	6216
C. Chemistry; metallurgy	3332	3645	5167	7894	5677	5362
D. Textiles; paper	197	216	320	253	299	342
E. Fixed constructions; mining	1156	1659	1977	1925	2087	2241
F. Mechanical engineering; lighting; heating; weapons; blasting	2144	2634	3062	3434	3972	4262
G. Physics	2172	3068	3734	4785	5736	6041
H. Electricity	1339	1796	2883	3212	3405	3663

* Patents granted to resident and non-resident applicants.

4.7. Patent applications by country of applicant's origin*

	2000	2005	2010	2016	2017	2018	Rank**
Russia	24093	25948	32837	31833	27807	30289	11
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	12
Italy	20410	17578	27948	31187	31393	32286	10
Japan	490772	530009	468438	456550	460771	460369	3
Republic of 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 the global ranking.

Sources: Rospatent Annual Reports; WIPO Statistics Database, November 2019.

4.8. Patent applications by country of applicant's origin: 2018

	Patent applications		
	Total	Of which filed	
		to the national patent office	abroad
Russia	30289	24926	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
Republic of Korea	232020	162561	69459
United Kingdom	56216	18599	37617
United States	515180	285095	230085

Sources: Rospatent Annual Reports; WIPO Statistics Database, November 2019.

4.9. Development of advanced manufacturing technologies by type and degree of novelty: 2018

	Total	Of which technologies	
		new to the country	radically new
Advanced manufacturing technologies	1565	1384	181
Of which:			
Design and engineering	458	420	38
Fabrication, processing and assembling	492	441	51
Automated material handling	40	37	3
Automated inspection and/or testing equipment	165	114	51
Communications and control	292	266	26
Manufacturing information systems	72	65	7
Integrated management and control	46	41	5

4.10. Use of advanced manufacturing technologies by type and duration: 2018

	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	254927	17146	49433	41355	146993
Of which:					
Design and engineering	41097	2706	8752	6717	22922
Fabrication, processing and assembling	80400	6198	13429	11151	49622
Automated material handling	2628	225	543	445	1415
Automated inspection and/or testing equipment	13717	1171	3401	2300	6845
Communications and control	104060	5952	19972	19031	59105
Manufacturing information systems	8257	667	2092	1147	4351
Integrated management and control	4768	227	1244	564	2733

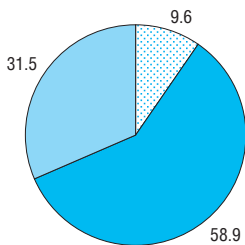
4.11. Technology balance of payments by category of contracts: 2018

(million USD)

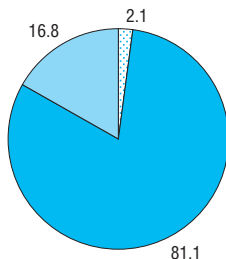
	Receipts from exports	Payments for imports	Balance of payments
Total	1405.5	3064.7	-1659.2
Invention patents	0.2	27.6	-27.4
Unpatented inventions	0.1	2.6	-2.5
Patent licenses	13.4	238.9	-225.5
Selective achievements	0.04	0.7	-0.7
Utility models	4.5	11.5	-7.0
Know-how	9.3	274.0	-264.7
Trademarks	4.9	521.0	-516.1
Industrial designs	0.4	1.7	-1.3
Engineering services	723.1	1406.8	-683.7
Research and development	413.6	107.4	306.2
Others	236.0	472.4	-236.4

4.12. Percentage distribution of technology exports and imports in Russia by country groups: 2018

Receipts from technology exports



Payments for technology imports



 CIS countries

 OECD countries

 Other countries



Innovation

5.1. Main indicators of enterprises' innovative activity*

	2014	2015	2016	2017	2018
Expenditure on technological innovation, <i>million roubles</i>	1211897.1	1203638.1	1284590.3	1404985.3	1472822.3
At constant 2010 prices	845824.3	780721.3	807410.6	837846.8	796292.4
As a percentage of total sales	2.9	2.6	2.5	2.4	2.1
Sales of innovative goods and services, <i>million roubles</i>	3579923.8	3843428.7	4364321.7	4166998.7	4516276.4
At constant 2010 prices	2498551.0	2492980.9	2743131.2	2484941.6	2441758.4
As a percentage of total sales	8.7	8.4	8.5	7.2	6.5

* Consolidated data on enterprises by types of economic activities: 2014–2016 – according to the Russian Classification of Economic Activities (Rev. 1) (OKVED1): sections C, D, E (except 40.13.2; 40.22.2, 40.30.6), codes 64, 72, 73, 74, since 2015 – including codes 45.21.7, 45.22, 45.25, since 2016 – codes 01.1, 01.2, 01.3, 01.4; 2017–2018 – according to OKVED2, codes 01.1, 01.2, 01.3, 01.4, 01.5, 01.6, sections B, C, D (except 35.14; 35.23, 35.30.6), E, codes 43.91, 43.99, 58, 61, 62, 63, 69, 70, 71, 72, 73, 74.

5.2. Expenditure on technological innovation: 2018

	Total, <i>million roubles</i>	Of which, <i>percentage</i>		
		R&D	Acquisition of machinery and equipment	Acquisition of technology
Total*	1472822.3	45.2	30.2	1.0
Industry	886785.8	24.4	44.2	1.3
Mining and quarrying	156701.6	16.1	69.1	0.6
Manufacturing	665044.6	27.8	41.1	1.4
High tech	117525.6	39.8	36.8	2.1
Medium high tech	139333.5	20.1	33.7	3.7
Medium low tech	309983.1	33.8	36.0	0.5
Low tech	98202.4	5.3	73.0	0.1
Electricity, gas, steam and air conditioning supply	18387.6	34.6	31.4	7.1
Water supply; sewerage, waste management and remediation activities	46652.0	1.0	9.9	0.5

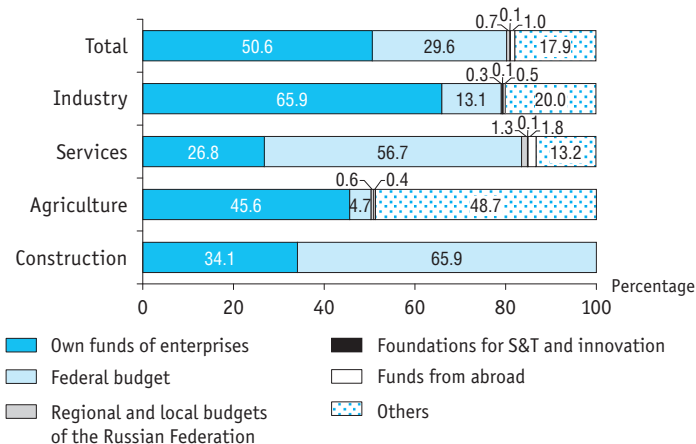
(continued)

	Total, <i>million roubles</i>	Of which, <i>percentage</i>		
		R&D	Acquisition of machinery and equipment	Acquisition of technology
Services	564026.3	79.0	6.7	0.5
Telecommunications, computer programming, consultancy and related activities, information service activities**	59827.4	30.4	14.4	0.5
Agriculture	21960.5	12.3	66.3	0.3
Construction	49.7	65.9	21.2	–

* Here and below – consolidated data on enterprises by types of economic activities according to OKVED2: codes 01.1, 01.2, 01.3, 01.4, 01.5, 01.6, sections B, C, D (except 35.14; 35.23, 35.30.6), E, codes 43.91, 43.99, 58, 61, 62, 63, 69, 70, 71, 72, 73, 74.

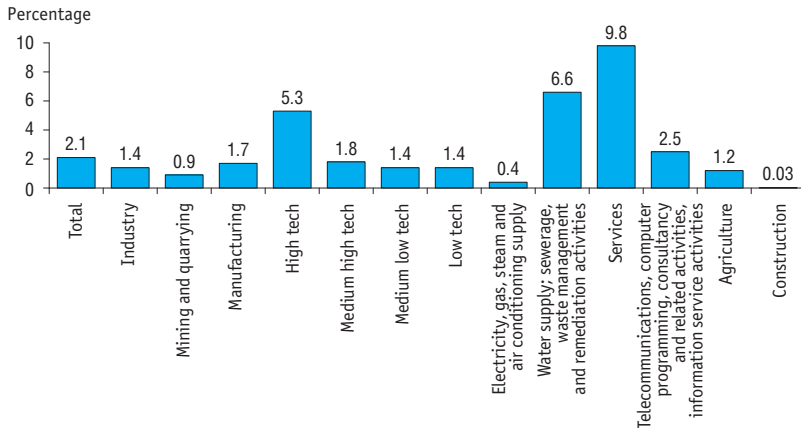
** Here and below – consolidated data on enterprises by the types of economic activities according to OKVED2: codes 61, 62, 63.

5.3. Expenditure on technological innovation by source of funds: 2018



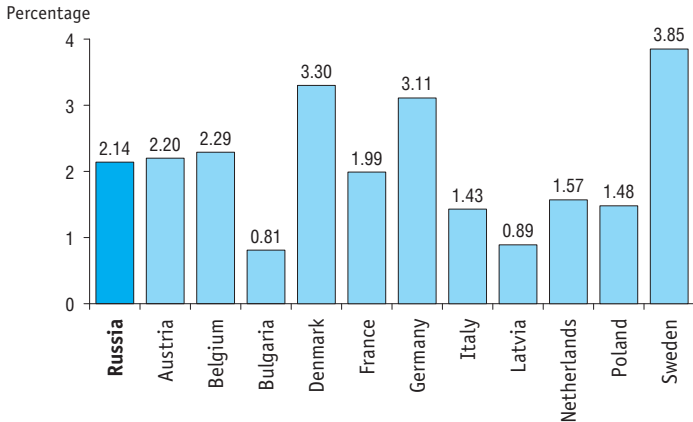
5.4. Intensity of expenditure on technological innovation: 2018

(ratio of expenditure to total sales of enterprises engaged in technological innovation)



5.5. Intensity of expenditure on technological innovation by country: 2018*

(ratio of expenditure to total sales of enterprises engaged in technological innovation)

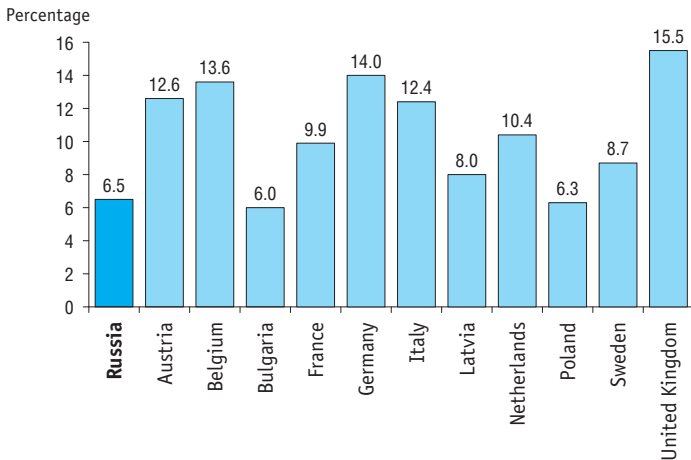


* Or nearest years for which data is available.

5.6. Sales of innovative goods and services: 2018

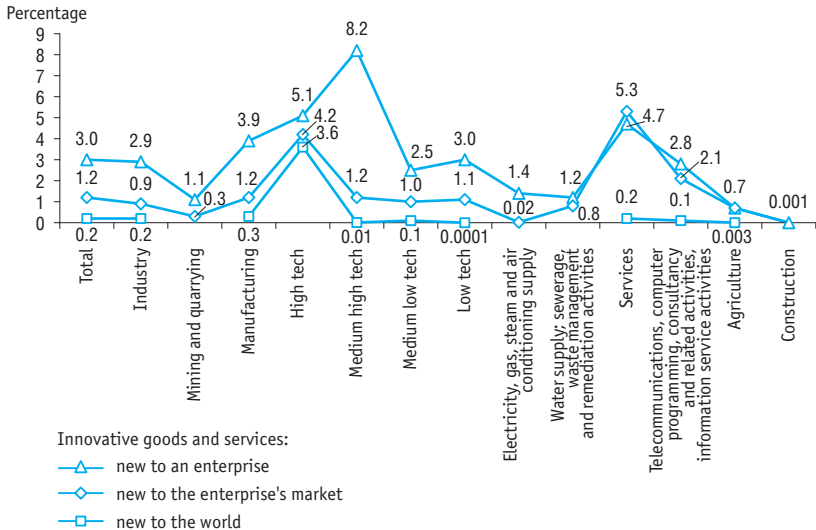
	Million roubles	As a percentage of total sales
Total	4516276.4	6.5
Industry	3693061.6	6.0
Mining and quarrying	603138.4	3.6
Manufacturing	2995867.0	7.7
High tech	380414.9	17.2
Medium high tech	893692.4	11.7
Medium low tech	1358863.6	6.2
Low tech	362896.2	5.2
Electricity, gas, steam and air conditioning supply	78929.6	1.6
Water supply; sewerage, waste management and remediation activities	15126.5	2.1
Services	789337.0	13.7
Telecommunications, computer programming, consultancy and related activities, information service activities	138610.7	5.7
Agriculture	33829.1	1.9
Construction	48.7	0.03

5.7. Share of innovative goods and services in total sales by country: 2018*



* Or nearest years for which data is available.

5.8. Share of technologically new or significantly improved goods and services in total sales: 2018



5.9. Innovative goods and services exports: 2018

	Million roubles	As a percentage of total sales of innovative goods and services
Total	1109780.2	24.6
Industry	987580.4	26.7
Mining and quarrying	226968.1	37.6
Manufacturing	760611.3	25.4
High tech	101085.4	26.6
Medium high tech	122896.5	13.8
Medium low tech	444353.4	32.7
Low tech	92276.1	25.4
Electricity, gas, steam and air conditioning supply	–	–
Water supply; sewerage, waste management and remediation activities	1.0	0.01
Services	121960.1	15.5
Telecommunications, computer programming, consultancy and related activities, information service activities	7125.1	5.1
Agriculture	239.7	0.7
Construction	–	–

5.10. Percentage distribution of enterprises taking part in joint R&D projects by type of partners: 2018

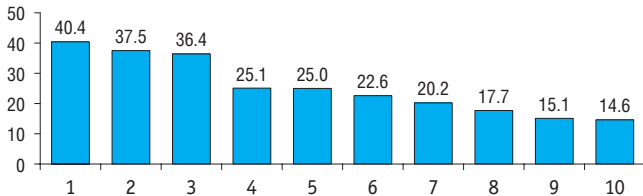
	Organisations within the same enterprise group	Consumers of goods and services	R&D institutions	Higher education institutions
Total	31.5	33.7	51.6	32.2
Industry	33.0	24.7	42.1	27.3
Mining and quarrying	43.6	–	56.4	30.9
Manufacturing	34.2	28.8	42.0	29.1
High tech	37.9	37.3	42.0	37.3
Medium high tech	30.8	27.6	37.4	22.4
Medium low tech	40.9	25.8	52.5	33.8
Low tech	16.9	21.1	26.8	16.9
Electricity, gas, steam and air conditioning supply	16.2	7.4	35.3	11.8

(continued)

	Organisations within the same enterprise group	Consumers of goods and services	R&D institutions	Higher education institutions
Water supply; sewerage, waste management and remediation activities	20.0	15.0	30.0	10.0
Services	30.8	42.4	61.7	37.7
Telecommunications, computer programming, consultancy and related activities, information service activities	23.4	34.4	12.5	15.6
Agriculture	5.3	31.6	10.5	5.3
Construction	–	100	–	–

5.11. Effects of innovative activity: 2016–2018*

(as a percentage of the number of enterprises having market-ready innovation in the last three years)



- 1 – Improving quality of goods or services
- 2 – Increasing range of goods or services
- 3 – Maintaining traditional market share
- 4 – Increasing market share
- 5 – Ensuring compliance with modern standards and regulations
- 6 – Increasing industrial capacities

- 7 – Improving communication within the organisation and with external entities
- 8 – Increasing flexibility for producing goods or services
- 9 – Increasing energy efficiency (lower energy consumption or energy losses)
- 10 – Improving working conditions, health or safety of the personnel

* The highly important effects of innovation for enterprises.

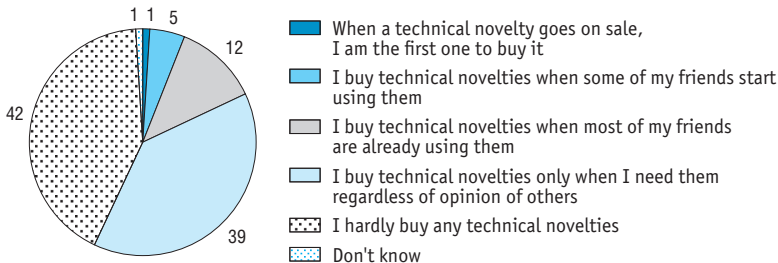


Public Attitudes towards Science, Technology and Innovation

6.1. Consumption of technological innovation: 2019*

(as a percentage of respondents)

Which statement describes you the most?



* Here and below the data is based on the results of a representative survey of the adult population aged 18–65 organised by the HSE Institute for Statistical Studies and Economics of Knowledge and conducted within the Russian Longitudinal Monitoring Survey (RLMS) with the support of the HSE Basic Research Programme. The survey was carried out in December 2018 – January 2019.

6.2. Sources of information about new goods and services: 2019

(as a percentage of respondents)

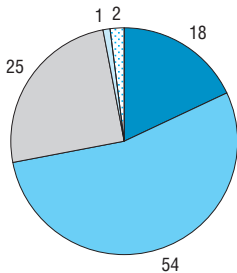
Which sources of information do you use to choose new goods and services?








6.3. Interest in science and technology news: 2019

(as a percentage of respondents)

What opinion about the role of news on science and technology is closest to you?

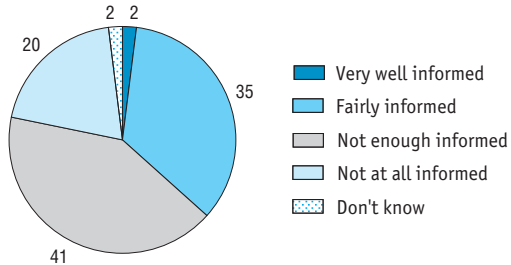


-  It is important for me to know the news about what is happening in the world of science and technology, to keep abreast of events
-  It is enough for me to have a general understanding of things, I don't need to know the latest news
-  There is no point for me in following the news on science and technology – it is much too difficult for me to understand
-  Other
-  Don't know

6.4. Population assessment of level of awareness about science and technology: 2019

(as a percentage of respondents)

How well informed do you feel about latest developments in science and technology?



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. An article belongs to a country if it is listed in the affiliated address of an author or one of the co-authors. Estimates reflect the situation as of November 25, 2019.

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 the types of economic activities according to codes of the Russian Classification of Economic Activities (Rev.2) (OKVED2): 43.91, 43.99.

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.

Innovative activity is a type of activity related to transformation of ideas (usually, R&D results or other S&T achievements) into technologically new or improved products or services introduced on a market; into technologically new or improved processes or techniques for producing (transferring) services, that have been used in real life. Innovation activities involve a combination of scientific, technological, organisational, financial, and commercial actions that result in new innovations.

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.

R&D personnel are professionals whose creative activities 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 sector includes consolidated data on enterprises by the types of economic activities according to 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 2016 and 2017 planning periods 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 laws on taxation and duties.

Technological innovations are the final result of innovation activities, embodied 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 practice.

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

Edited by *D. Beylina*

Design *P. Shelegeda*

Desk-top publishing *T. Koltsova, V. Parshina*

Format $84 \times 108^{1/64}$.
Print sheet 1.3125. Print run 150 copies.

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