

MANUAL

for filling in the “Annual Report on R&D” for: business subjects and centres of excellence, faculties, scientific and R&D institutes and non-profit organisations/associations.

(Form: IR).

Manual

The objective of this manual is to facilitate the filling in of the questionnaire and to raise the quality of this task. The questionnaires are to be completed for all institutions and/or units where there are at least one researcher, scientist or engineer with full-time equivalent (FTE annually) working on a research and development.

The manual gradually explains every part of the questionnaire and, through examples, shows how to fill in the questionnaire correctly.

A tertiary education institution belonging to university (as a reporting unit) is taken as an example of correct completion of the questionnaire. The data shown in the mentioned examples in the manual are random and are to be used only as a trial.

The questionnaire refers to the measurement of entry in R&D: R&D personnel and R&D expenditures. R&D personnel are to be classified by educational attainment, titles, age and sex, expressed as the real number of persons and full-time equivalent (FTE). R&D expenditures show mainly so-called intramural expenditures, i.e. R&D expenditures within the reporting unit or sector to which the unit belongs to. They include current expenditures and capital investments in order to obtain data on who finances and who performs R&D. Scientific works, projects and studies presented as a R&D result.

The first page of the questionnaire /R&D form

The first page of the R&D questionnaire contains data on the title, registration number, address, activity, ownership form and scientific field of the reporting unit. The main difference of the R&D activity and activities other than R&D is the presence or absence of novelty or innovation elements to a greater extent. If an activity introduces considerable improvement in technical characteristics, components, materials and software, user's orientation or other functional characteristics, i.e. uses a new or considerably improved product, process or service as well as new organisational methods in business and labour organisation, it should be obligatorily included in this survey.

The code of the corresponding activity is to be copied down from the annexed Classification of Activities, 2010, which is to be transmitted to the reporting unit together with the R&D questionnaire/form. Also, the annexed Classification of Fields of Science and Technology is to be used to write down the scientific field.

Table number 1

The first table to be filled in is on the second page of the questionnaire under number 1, entitled: *“Full-time or part-time employees engaged in R&D activities, expressed in number of physical persons and full-time equivalent in the reference year.”*

		Total number of employees engaged in R&D activities				Number of full-time employees engaged in R&D activities		Part-time employees engaged in R&D activities			
		Number of employees		Full-time equivalent		Total	Women	Number of employees		Full-time equivalent	
		Total (5+7)	Women (6+8)	Total (5+9)	Women (6+10)			Total	Women	Total	Women
a		1	2	3	4	5	6	7	8	9	10
01	Total (02 to 05)	54	29	32,5	18,5	11	8	43	21	21,5	10,5
02	Researchers	52	28	31,5	18,0	11	8	41	20	20,5	10,0
03	Assistant-researchers	2	1	1,0	0,5			2	1	1,0	0,5
04	Technical staff										
05	Other staff										

Table 1 should cover the total number of employees engaged in R&D activities, who work full-time or part-time on those activities, by title, sex, number of physical persons and full-time equivalent (FTE).

The number of employees engaged in R&D activities should be indicated in the table, as the sum of full-time and part-times employees.

The real amount of time spent on R&D activities to full-time equivalent is to be indicated under part-time employees. The unit of measurement for the given data is the full-time equivalent (FTE). The abbreviation FTE will be used in the manual for full-time equivalent.

Concretely, our example shows that there are 43 employees who do not spend full-time on R&D activities (the data is in column 7 in table 1) but only 21.5 FTE. This means that their real contribution to R&D activities is 21.5 full-time employees engaged in R&D activities.

Full-time equivalent (FTE) is a unit of measurement of employees, which allows to compare the employees even though they work a different number of hours within the working week/year.

A full-time employee is counted as one (1) full-time equivalent or part-time FTE = 1. An employee who does not work full-time obtains a proportional value relative to the hours she/he has worked. For example: an employee not working full-time but 20 hours per week has a FTE value of 0.5 because full-time is 40 working hours per week. Mathematically: $20 : 40 = 0,5$.

The data related to full-time equivalent, in columns 3, 4, 9 and 10, are to be indicated in decimal numbers with one decimal.

Also, on the page of the R&D form containing Table 1 there is an additional instruction for entering data in columns 3, 4, 9 and 10 on full-time equivalent.

In the mentioned example for filling the table, there are 54 employees being engaged in R&D activities. Of 54 persons, 29 are women. The full-time equivalent for the total number of employees is 32,5, of which FTE for female employees is 18,5.

Row 02 refers to employees holding the title researchers. In our example, of 52 persons employed as researchers, 28 are women. The full-time equivalent for this category is 31.5 FTE, of which the female population is 18 FTE.

Row 03 refers to employees holding the title assistant-researchers. In our example there are two employees, of which one is a woman. The example shows that both persons are working part-time on R&D activities because the data about them is indicated in columns 7 and 8 where persons who work part-time on R&D activities are indicated. The FTE for both persons is 1, of which 0.5 FTE is for the female person. The two assistant-researchers are working only part-time in the year on R&D activities.

At the end of Table 1, the values in categories “*Researchers*”, “*Assistant-researchers*”, “*Technical staff*” and “*Other staff*” are to be added up after having filled in Table 1. As there is no data in the other categories, except for “*Researchers*” row (02) and “*Assistant-researchers*” row (03), the values of the mentioned items are to be added up to obtain the sum in the first row (01) “*Total*”: 54 employees, of which 29 are women, who have a full-time equivalent FTE of 32.5, and of which the FTE for women is 18.5.

Also, the sum of columns 5 and 7 should correspond to the data from column 1, and the sum of columns 6 and 8 to the data from column 2.

To better understand this table, explanations from the Frascati Manual are indicated, which is the international standard produced by OECD (Organization for Economic Cooperation and Development) and which serves as the methodological basis for the survey on R&D.

A researcher is a person with at least tertiary educational attainment, i.e. having at least completed undergraduate academic studies and who is engaged in R&D work, and holding the title pursuant to the law.

Assistant-researchers do not hold any research title, work directly with researchers in carrying out professional or technical works relative to R&D tasks (laboratory technicians, engineers and technicians of technical sciences, designers, librarians, information assistant, computer experts, language editors, etc.).

Administrative workers carry out exclusively or predominantly organisational, clerical, legal, administrative or financial work (treasurer, secretaries, jurists, etc.).

Other personnel carry out supporting activities in R&D organisations (employed in workshops, on agricultural land, couriers, switchboard operators, maintenance workers, drivers, suppliers, etc.).

Excluded are personnel engaged in protection and security, restaurants, hygiene maintenance, and related activities (guards, desk clerks, charwomen, etc.).

There are three stages to value R&D personnel:

- Identification of the type of personnel that should be valued,
- Establishing their number,
- Establishing their activity in FTE.

One FTE researcher can be presented as researcher/year. Therefore, the persons who spend 30% of their time on R&D and the rest on other activities (teachers, university administration....) should be counted as 0.3 FTE. Similarly, if a FTE worker is employed in a R&D institution for a six-month period, this will be counted as 0.5 FTE. Considering that the length of a working day varies from one sector to another, as well as from one institution to another, it is impossible to express FTE in researcher/hours.

In practice, all those who participate with more than 90% of their time should be counted as 1 FTE, while those who are engaged less than 10% should be excluded from the valuation.

Table 2

Table 2 entitled “*Persons engaged in R&D activities on the basis of a service contract (SC) or author contract (AC), expressed in number of physical persons and full-time equivalent, in the reference year*”, should contain the number of employed persons who are involved in R&D activities based on a service contract or author contract by titles/occupations.

		Employees based on SC and AC in R&D			
		Number of employees		Full-time equivalent	
		All	Women	All	Women
a		1	2	3	4
01	All (02 до 05)	1	1	0,3	0,3
02	Researchers	1	1	0,3	0,3
03	Assistant-researchers				
04	Technicians				
05	Other personnel				

Our example shows one employee who was engaged as *researcher* on service contract and was actually involved in R&D activities during 85 working days. It is worth knowing that one calendar year has on average 252 working days, when calculating FTE. The aforesaid is used to determine the full-time equivalent:

$$85 : 252 = 0,34.$$

As FTE is expressed with one decimal, the obtained quotient 0.34 is rounded to 0.3, which is at the same time the FTE - the value of the work of the employee performed in R&D.

It is very important to include all the persons engaged in R&D activities in their reporting units, whether those persons are employed in some other institutions or not (e.g. faculties, institutes, etc.).

Table 3

Table 3 entitled: “*Employees engaged in R&D activities, by educational attainment, expressed in physical number of persons and full-time equivalent, in the reference year*”, should be filled in with the total number of employees and their FTE, by title and educational attainment. Read the comments below Table 3 in the R&D questionnaire, reading:

- The data in columns 1 and 2 (rows 01 to 05) in Table 3 should correspond to the data in columns 1 and 2 in Table 1;
- The data in columns 1 and 2 (rows 06 to 10) in Table 3 should correspond to the data in columns 3 and 4 in Table 1;
- Column 1 equals the sum of columns 3, 5, 7 and 9, and column 2 equals the sum of columns 4, 6, 8 and 10.

	Total		Educational attainment								
			Doctor's degree		Master's degree/specialisation		University education		Secondary and other education		
	All	Women	All	Women	All	Women	All	Women	All	Women	
<i>a</i>	1	2	3	4	5	6	7	8	9	10	
Employees engaged in R&D activities (number of physical persons)											
01	Total (02 to 05)	54	29	36	18	4	2	14	9		
02	Researchers	52	28	34	17	4	2	14	9	X	X
03	Assistant-researchers	2	1	2	1						
04	Technicians										
05	Other personnel										
Employees engaged in R&D activities (full-time equivalent)											
06	Total (07 do 10)	32,5	18,5	21,5	11,0	4,0	2,0	7,0	5,5		
07	Researchers	31,5	18,0	20,5	10,5	4,0	2,0	7,0	5,5	X	X
08	Assistant-researchers	1,0	0,5	1,0	0,5						
09	Technicians										
10	Other personnel										

By following the mentioned comments, when filling in the table one should first copy down the total number of employees and "women" from columns 1 and 2 in Table 1 into columns 1 and 2 (rows 01 to 05) of Table 3. After having copied down the total number of employees, 54 in column 1 and of women, 29 in column 2 of Table 3, the number of employees, holding the titles researchers and assistant-researchers, is to be copied from the same columns of Table 1 to Table 3. The given example shows that there are 52 researchers, of which 28 women, and 2 assistant-researchers, of which 1 woman. Afterwards, the number of employees - Total and by categories is to be broken down into selected educational attainment.

To fill in the second part of the table referring to the full-time equivalent, one should first copy from columns 3 and 4 of Table 1 the indicated FTE values into columns 1 and 2 (rows 06 to 10) of Table 3. Once the total FTE values of 32.5 in column 1 and 18.5 in column 2 of Table 3 are copied, the values for the titles researchers and assistant-researchers are to be copied from the same columns of Table 1 into Table 3. The data for researchers are 31.5 and 18 FTE, and 1 and 0.5 FTE for assistant-researchers. Afterwards, these values are to be broken down into selected educational attainment.

Table 4

Table 4, entitled “*Employees engaged in R&D activities, based on service contract (SC) or author contract (AC), by educational attainment, expressed in number of physical persons and full-time equivalent, in the reference year*”, should be filled in with the total number of employees being engaged based on the mentioned contracts, by title and educational attainment, and with their FTE.

		Total		Educational attainment							
				Doctor's degree		Master's degree/specialisation		University education		Secondary and other education	
		All	Women	All	Women	All	Women	All	Women	All	Women
<i>a</i>		1	2	3	4	5	6	7	8	9	10
Employees engaged in R&D activities based on service contract or author contract (number of physical persons)											
01	Total (02 to 05)	1	1	1	1						
02	Researchers	1	1	1	1					X	X
03	Assistant-researchers										
04	Technicians										
05	Other personnel										
Employees engaged in R&D activities based on service contract or author contract (full-time equivalent)											
06	Total (07 to 10)	0,3	0,3	0,3	0,3						
07	Researchers	0,3	0,3	0,3	0,3					X	X
08	Assistant-researchers										
09	Technicians										
10	Other personnel										

The given example shows that there is one employee, a woman, engaged in R&D activities based on a service contract. The person is a researcher and holds a doctor's degree. Table 2 shows that this person has 0.3 FTE relative to full-time so that the value of 0.3 FTE is to be copied into the corresponding places in Table 4.

The value 0.3 can be the result of work, where the researcher works 2.5 hours per day on R&D activities, or 12 hours per week or about 30% of the working time on annual level.

The data in columns 1 and 2 (rows 01 to 05) in Table 4 should equal the data in columns 1 and 2 of Table 2.

The data in columns 1 and 2 (rows 06 to 10) in Table 4 should equal the data in columns 3 and 4 of Table 2.

Column 1 equals the sum of columns 3, 5, 7 and 9, and column 2 equals the sum of columns 4, 6, 8 and 10.

Table 5

Table 5, entitled “*Full-time and part-time employees engaged in R&D activities, by age and sex, expressed in number of physical persons, in the reference year*”, should be filled in with the number of employees engaged in R&D activities classified by title and age group.

		Researchers				Assistant-researcher				Technicians			
		Full-time employees		Part-time employees		Full-time employees		Part-time employees		Full-time employees		Part-time employees	
		All	Women	All	Women	All	Women	All	Women	All	Women	All	Women
<i>a</i>		1	2	3	4	5	6	7	8	9	10	11	12
01	Total (02 to 07)	11	8	41	20			2	1				
02	Less than 25 years old	1	1										
03	25 – 34	8	6	13	5								
04	35 – 44			12	8			1	1				
05	45 – 54	1	1	7	2								
06	55 – 64			9	5			1					
07	65 and over	1											

In Table 5 the columns refer to the categories of employees by title, and within these categories by sub-category: *full-time and part-time employees*. The rows refer to age groups, where one should indicate employees by age group in the given intervals. At the end, each row should be added up in the column for all the indicated titles in order to obtain “*Total (02 to 07)*” under ordinal number 01.

The data in this table should match the data indicated in Table 1:

Full-time employees:

- Researchers: row 02, columns: 05, 06
- Assistant-researchers: row 03, columns: 05, 06
- Technicians: row 04, columns: 05, 06

Part-time employees:

- Researchers: row 02, columns: 07, 08
- Assistant-researchers: row 03, columns: 07, 08
- Technicians: row 04, columns: 07, 08

Table 6

Table 6, entitled: “*Full-time and part-time researchers, by citizenship and sex, expressed in number of physical persons*”, should be filled in with the number of researchers by citizenship (geographical location of the country). It is important that this table contain **the number of researchers**, not the total number of employees. These data are particularly important to monitor **researchers’ mobility**.

	Citizenship (by geographical location of the country)	Total number of researchers in 20__.		Researchers who came to Serbia in 20__		Researchers who went abroad in 20__		Planned number of researchers for 20__
		All	Women	All	Women	All	Women	
	<i>a</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
01	All (02 до 09)	52	28	1	1			55
02	Serbia	52	28					
03	EU member countries							
04	Other European countries							
05	North America							
06	Central and South America							
07	Asia							
08	Africa							
09	Other							

Columns 3 and 4 contain all the researchers who came from abroad during the reference year and worked in R&D more than 3 months.

Columns 5 and 6 contain all the researchers who left Serbia during the reference year.

The data in row 01 in columns 1 and 2 of this table should **correspond to the data in Table 1 in columns 1 and 2**:

Researchers – all and researchers – women (row 02).

Table 7

In Table 7, entitled “*Expenditures for R&D activities in the reference year (in thousands of RSD)*“, one should indicate all financial funds spent for R&D activity in the reference year, as well as total planned funds for the next year.

Expenditures for R&D			Spent in 20__	Planned for 20__
a			1	2
01	Total expenditures for R&D (02+08+13)		39307	
02	Current costs	All (03+05+06+07)	32785	
03		Gross salaries and wages for all R&D employees	32785	
04		Of which gross salaries and wages of researchers	31690	
05		Social contributions borne by the employer (indirect and direct)		
06		Educational costs		
07		Other labour costs		
08		Other current costs	All (09+10+11+12)	5989
09	For payments on the basis of service contract and author contract		2369	
10	Purchase of R&D related services		609	
11	For material costs for R&D (raw materials, materials, energy)		1100	
12	Other operating costs and expenses (administration costs, etc.)		1911	
13	Investment costs	All (14+15+19+20)	533	
14		For land and buildings		
15		For machinery and equipment:	533	
16		Information and communication equipment	150	
17		Transport equipment	175	
18		Other machinery and equipment	208	
19		Investment in software		
20		Other intellectual property products (patents, licenses, studies, projects, etc.)		

The table is designed so to have spent funds grouped into two main categories: one represents current costs and the other one investment costs. Current costs have an additional sub-category entitled “*Labour costs and employees’ remunerations*“, and “*Other current costs*“. The given categories and sub-categories are further classified into cost classes. The sub-category “of which *Gross salaries and wages for researchers*“ is not included in the sum “all“ (row 02) because it represents gross salaries and wages of all employees in R&D activity.

Labour costs of R&D personnel represent the largest item in current costs. *Other current costs* include non-capital investments in materials, equipment and services for R&D during a year. Additional costs and costs of administration personnel are counted in this group of costs, but costs of activities other than R&D should be deducted from them. Personnel costs include also costs for social and pension funds for R&D personnel. Costs of indirect services are also included, whether originating from the same reporting unit or not (warehousing costs, repair and maintenance of premises, printing of reports, etc.).

Investment costs are total annual costs of real estates for R&D for the reporting unit. They are to be completely indicated for the period in which they occurred and do not contain depreciation elements. They are composed of: costs for land and buildings, as well as of costs for machinery and equipment. The costs for land and buildings: land refers only to the land that is necessary for R&D (land for exploration, for laboratories and pilot installations) and for buildings intended for improvements, modifications and repairs. The share of these costs is difficult to establish so estimation is to be used.

The sub-category “*Information and communication equipment*”, “*Transport equipment*” and “*Other machinery and equipment*” under Investment costs are not to be counted in the sum of investment costs (all, row 13) because they represent a part of total investments in machinery and equipment.

The given example shows the purpose of spent resources through data that are to be indicated in corresponding cost classes. Funds are to be indicated in **thousands of dinars**.

The planned funds are to be entered only in the total amount, without breakdown by categories.

Table 8

Table 8, entitled, “*Sources of funds spent on R&D activities in the reference year*”, should be filled in with the sources of financing R&D work.

Sources of funds			Amount in thousands of RSD	
a			1	
01	Funds spent for R&D by sources - total (02 to 20)		39307	
02	Financing sources from Serbia	Own funds of the reporting units		
03		Budgetary funds for R&D	From the Ministry of Education, Science and Technological Development	37315
04			From other ministries	
05			General funds of universities/faculties	
06		Funds for R&D from government funds, agencies and foundations		
07		Funds for R&D from local authorities		202
08		Funds for R&D from business subjects	From other enterprises in the same group	
09			From other enterprises outside the group	
10		Funds from tertiary education institutions		
11		Funds for R&D from non-profit organisations		
12		Other funds for R&D from domestic sources		
13	Financial funds from abroad	Funds from enterprises in the same group		
14		Funds from other enterprises outside the group	1567	
15		Funds from R&D from foreign governments		
16		Funds for R&D from universities and other tertiary education institutions		
17		Funds for R&D from non-profit organisations		
18		Funds for R&D from the European Commission		
19		Funds for R&D from international organisations		
20		Other foreign funds		223

The data in row 01 should equal the data in row 01, column 1 in Table 7 (*Total expenditures for R&D*). The mentioned amounts should be indicated in **thousands of dinars**.

The sources are divided into two categories: the first category refers to domestic sources, and the second one to sources of financing from abroad.

This category includes a sub-category of financing sources. In domestic sources (from the Republic of Serbia), several sources are proposed (ministries, funds, agencies) grouped under the title “*Budgetary funds for R&D*” and “*Funds for R&D from business subjects*”. Row number 02 refers to funds from own sources spent for R&D activity.

The given example shows funds for R&D originating from the Ministry of Education, Science and Technological Development and to a smaller extent from local authorities, funds from other enterprises outside the group, as well as from other foreign funds.

Table 9

Table 9, entitled “*Number and value of R&D works (projects and studies), by fields of science and types of research (include also projects financed by own funds), in the reference year*”, should be filled in with the number of research work by fields of science and types of research, as well as amount of funds spent on R&D, distributed by type of research and fields of science.

Fields of science		Total		Type of researches					
				Basic		Applied		Experimental	
		<i>Number of works</i>	<i>Value</i>	<i>Number of works</i>	<i>Value</i>	<i>Number of Works</i>	<i>Value</i>	<i>Number of Works</i>	<i>Value</i>
<i>a</i>		1	2	3	4	5	6	7	8
01	All (02 to 08)	7	39307	5	37739			2	1568
02	Natural sciences, mathematics	7	39307	5	37739			2	1568
03	Engineering and technology								
04	Social sciences								
05	Humanities								
06	Medical sciences								
07	Agricultural sciences								
08	Multidisciplinary sciences								

For ongoing projects (non-finished), indicate the value of finalised stages until the end of the reference year. It is worth mentioning that the data in column 2 “*Value*”, in row 01 should match the data in row 01 in Table 7 “*Total expenditures for R&D*”. Also, it should be identical to the data indicated in row 01 in Table 8 “*Funds spent for R&D by sources – total*”.

The data for the value are to be indicated in **thousands of dinars**.

We stress out that for every indicated number of researches (works), one should indicate their value in thousands of dinars.

In our example there are 7 works and all of them belong to the field of science: natural sciences, mathematics, or which 5 belong to basic researches and 2 to experimental ones. Also, Table 9 shows that total funds were invested in natural sciences, mathematics. A minor amount of funds was invested in experimental researches, and more than 95% of funds in basic researches.

Use the classification in the Annex to establish to which field of science a research belongs to.

- **BASIC** research is a creative, systematic activity focused on acquiring new knowledge on the origin and causes of phenomena and facts, without any particular application or use in view. The results of a basic research are often formulated as general principles, theories or rules.

- **APPLIED** research is undertaken whether to establish a possibility to use the results of a research, having in mind its practical application, or to find new methods or ways that facilitate the achievement of a particular objective set in advance. This survey starts from existing knowledge and examines it thoroughly in view of solving specific issues.

- **EXPERIMENTAL (DEVELOPMENT)** research is a creative systematic activity based on the results of the basic and applied research, and practical knowledge directed towards introducing new materials, products, devices, processes and methods.

Table 10

In Table 10, entitled “Expenditures for the purchase of R&D related services in the reference year (in thousands of RSD)“, one should indicate the expenses for R&D performed for you by third persons.

	a	1
01	Total expenditures for the purchase of R&D services from (02+08):	10580
02	Subjects in the country (03 to 07)	10580
03	Business subjects	
04	Government sector (public research institutions)	10580
05	Private research institutes/laboratories	
06	University and other tertiary education institutions	
07	Private non-profit organizations	
08	Subjects abroad (09 to 14)	
09	Business subjects	
10	Government sector (public research institutions)	
11	Private research institutes/laboratories	
12	University and other tertiary education institutions	
13	Private non-profit organizations	
14	International organizations	

Expenses for the purchase of R&D services (extramural expenditures) are compensations for R&D work performed separately by an enterprise/institution outside your reporting unit. Financing or expenditures for extramural R&D works (i.e. R&D outside a statistical unit) is not to be included in the amount of extramural R&D - total, which is presented in Table 7.

The data are to be shown in **thousands of dinars**.

In the given example the reporting unit in the reference period purchased R&D services from the government sector (public research institutions) in the country.

At the end of the questionnaire, the date when the questionnaire was filled in should be entered, as well as the name and surname of the person who did it, contact telephone number or e-mail, as well as the name and surname of the reporting unit manager.

For more explanations please contact the Statistical Office of the Republic of Serbia in Belgrade at 011 2412 922, extension 425.

Annexe: - Classification of fields of science

- Classification of activities CA_2010