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LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI U 2020.

HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY, 2020

U Republici Hrvatskoj bilo je 746 140 osoba u dobi od 25 do 64 godine koje smatramo ljudskim potencijalima u znanosti i tehnologiji.

Prikazani su podaci koji se temelje na podacima Ankete o radnoj snazi (ARS-u), a pokazuju postojeće i potencijalne udjele ljudskih potencijala u znanosti i tehnologiji.

Ekonomsko okružje koje se brzo mijenja te sve veći naglasak na ekonomiji temeljenoj na znanju dovelo je do povećanja međunarodnog interesa za mjerenje odgovarajućih vještina i njihove uloge. Podaci o ljudskim potencijalima mogu poboljšati naše razumijevanje ponude i potražnje na tržištu rada za osobama u području znanosti i tehnologije.

Prema rezultatima Ankete o radnoj snazi, u Hrvatskoj je bilo više od 746 tisuća visokostručnih osoba – ljudskih potencijala u znanosti i tehnologiji (HRST-u) u dobi od 25 do 64 godine. Njih 552 tisuće smatra se ljudskim potencijalima u znanosti i tehnologiji prema obrazovanju (HRSTE), a 593 tisuće prema zanimanju (HRSTO). Ljudskih potencijala u znanosti i tehnologiji koji zadovoljavaju oba kriterija (HRSTC) bilo je više od 398 tisuća.

Udio ljudskih potencijala u znanosti i tehnologiji (HRST) u dobi od 25 do 64 godine u aktivnom stanovništvu iste dobne skupine iznosi 46,0%, dok udio populacije HRSTC iznosi 24,6%.

Analiza populacije ljudskih potencijala u znanosti i tehnologiji (HRST) prema dobnim skupinama i spolu pokazuje da je udio žena za 5,6 postotnih bodova veći u odnosu na udio muškaraca. Najzastupljenija je dobna skupina od 45 do 64 godine s nešto manje od 293 tisuće osoba. Zastupljenost žena najveća je u dobnoj skupini od 25 do 34 godine (57,4%), dok je u dobnoj skupini od 45 do 64 godine udio žena najmanji i iznosi 48,9%.

In the Republic of Croatia, there were 746 140 persons aged 25 to 64 who we consider to be human resources in science and technology.

The results based on the Labour Force Survey data (LFS) are presented, which show current and potential stocks of human resources in science and technology.

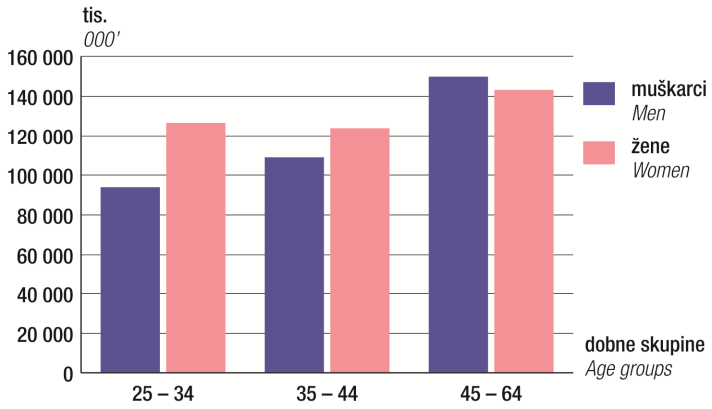
A rapidly-changing economic environment and a growing emphasis on the knowledge-based economy have led to a mounting international interest in the role and measurement of relevant skills. Data on human resources in science and technology (HRST) can improve our understanding of both the demand for, and supply of, science and technology personnel on the labour market.

According to the results of the Labour Force Survey, there were more than 746 thousand highly qualified persons – human resources in science and technology (HRST) aged 25 to 64 in Croatia. There were 552 thousand persons who have successfully completed a university-level education (HRSTE) and 593 thousand persons who are employed in science and technology occupations as professionals, technicians and associate professionals and managers (HRSTO). There were more than 398 thousand persons in the group that fulfils both criteria (HRSTC).

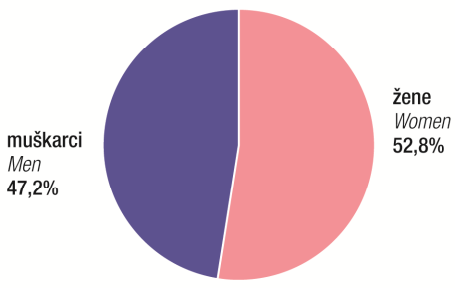
The share of human resources in science and technology (HRST) aged 25 to 64 in the active population of the same age group was 46.0%, while the share of the HRSTC was 24.6%.

The analysis of the population of human resources in science and technology (HRST) by age groups and sex shows that the share of women was 5.6 percentage points higher than that of men. The most represented age group was 45 to 64 with slightly less than 293 thousand persons. The share of women was the highest in the 25 to 34 age group (57.4%), while in the 45 to 64 age group the share of women was the lowest, amounting to 48.9%.

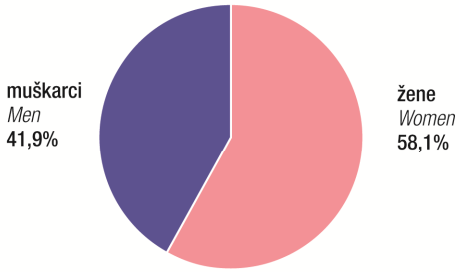
G-1. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI (HRST) PREMA DOBNIM SKUPINAMA U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY (HRST), BY AGE GROUPS, 2020



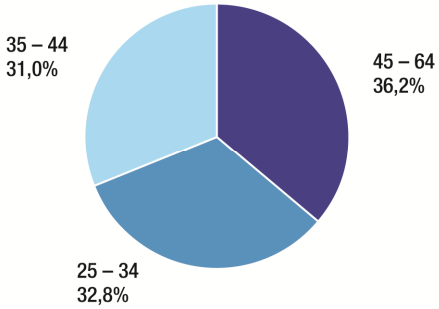
G-2. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI (HRST) PREMA SPOLU U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY (HRST), BY SEX, 2020



G-3. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTE PREMA SPOLU U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTE, BY SEX, 2020



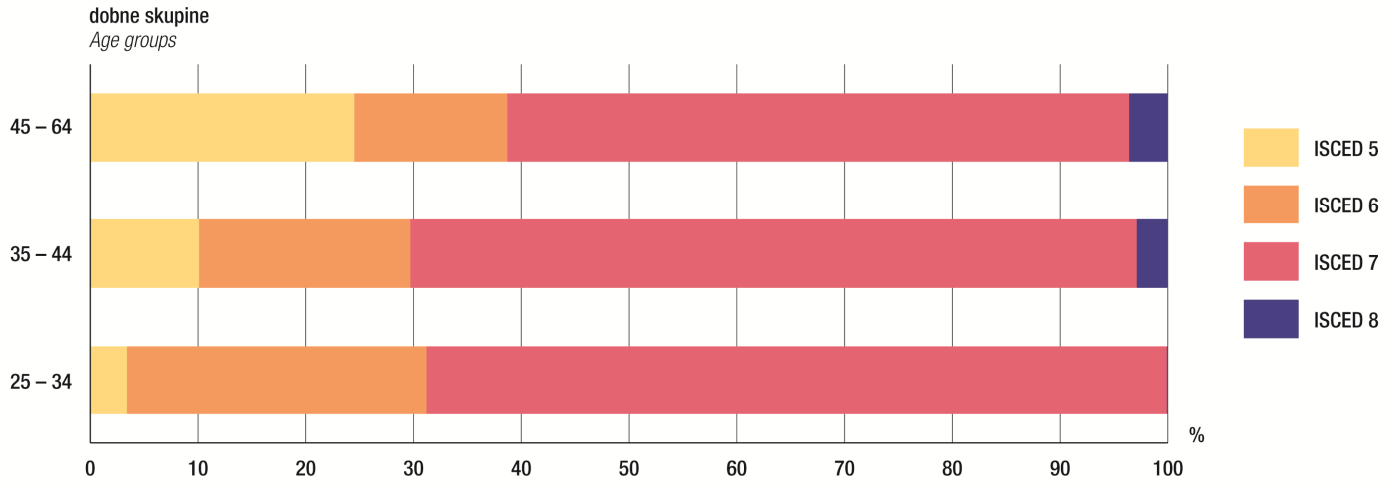
G-4. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTE PREMA DOBNIM SKUPINAMA U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTE, BY AGE GROUPS, 2020



Analiza populacije ljudskih potencijala u znanosti i tehnologiji prema obrazovanju (HRSTE) prema dobnim skupinama pokazuje da su najzastupljenije osobe s više od 45 godina, njih ukupno 36,2%, dok je 32,8% udio osoba u dobnoj skupini od 25 do 34 godine. Najmanje je osoba u dobnoj skupini od 35 do 44 godine, 31,0%. Udio žena u populaciji HRSTE jest 58,1%. U dobnoj skupini od 25 do 34 godine čak je 62,0% žena, dok je udio muškaraca i žena u dobnoj skupini od 45 do 64 godine gotovo izjednačen, muškaraca je 46,6% u odnosu na 53,4% žena. U svim dobnim skupinama najviše je osoba s postignutim obrazovanjem na razini ISCED-a 7 (68,6% osoba u dobi od 25 do 34 godine i 67,4% osoba u dobi od 35 do 44 godine ima postignutu tu razinu obrazovanja). Najviše je doktora znanosti (ISCED 8), njih 3,6%, u dobnoj skupini od 45 do 64 godine.

The analysis of the population of human resources in science and technology by education (HRSTE) and by age groups shows that persons aged 45 and over were the most prevalent, accounting for 36.2% of the total number, while the share of persons in the 25 to 34 age group was 32.8%. The smallest share was calculated for the 35 to 44 age group, 31.0%. The share of women in the HRSTE population was 58.1%. In the 25 to 34 age group, there were 62.0% of women, while the share of men and women in the 45 to 64 age group was almost the same, 46.6% for men and 53.4% for women. In all age groups, persons with educational attainment equal to ISCED level 7 had the highest share (68.6% of persons in the 25 to 34 age group and 67.4% of persons in the 35 to 44 age group). The largest number of persons who have earned the academic title of Doctor of Science (ISCED level 8), 3.6% of them, were in the 45 to 64 age group.

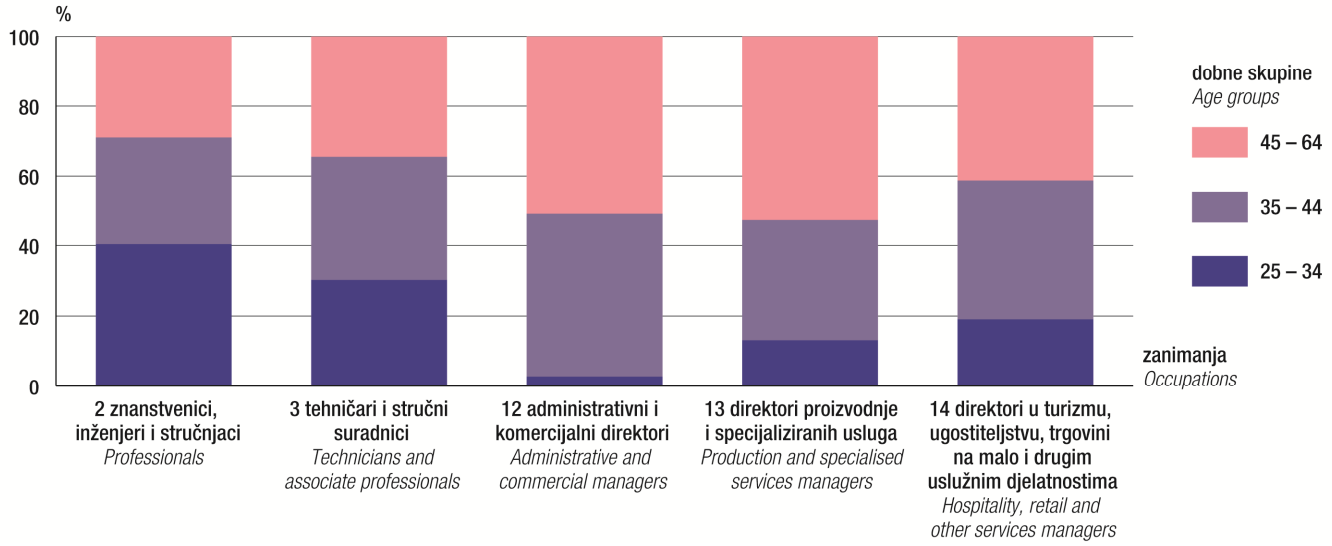
G-5. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTE PREMA RAZINAMA OBRAZOVANJA I DOBNIM SKUPINAMA U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTE, BY LEVELS OF EDUCATION AND AGE GROUPS, 2020



U populaciji HRSTE 85,4% osoba je zaposleno, 4,4% nezaposleno, a 10,2% osoba neaktivno. Udio zaposlenih žena u populaciji HRSTE jest 57,3%. Većinu čine osobe koje su zaposlene na puno radno vrijeme, 96,2%, dok je 3,8% osoba zaposleno na manje od punoga radnog vremena.

Within the HRSTE population, 85.4% of persons were employed, 4.4% unemployed and 10.2% inactive. The share of employed women in the HRSTE population was 57.3%. Most persons (96.2%) were employed full-time in science and technology activities, while 3.8% of them were employed part-time.

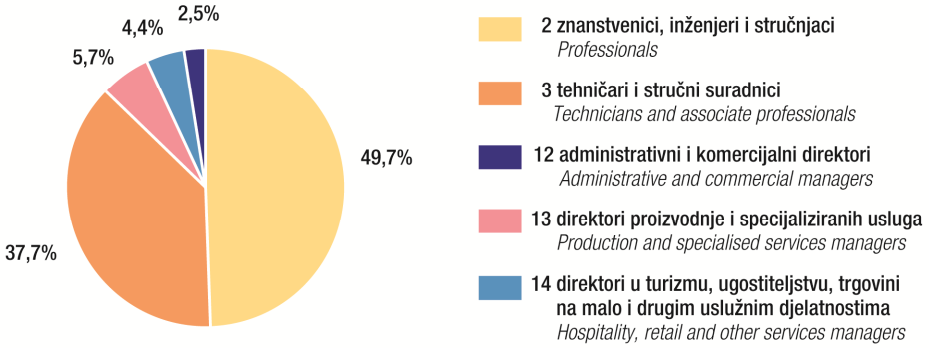
G-6. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTO PREMA DOBNIM SKUPINAMA I ZANIMANJU U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTO, BY AGE GROUPS AND OCCUPATION, 2020



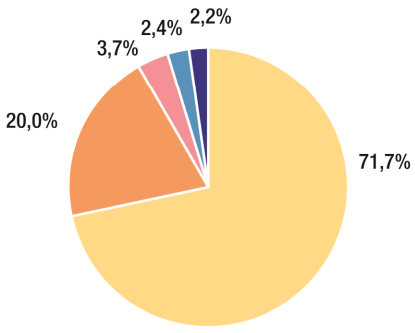
Ljudski potencijali u znanosti i tehnologiji prema zanimanju (HRSTO) skupina je ljudi koja aktivno sudjeluje u znanosti, tehnološkom razvoju i inovacijama. Iz ovog je grafikona vidljivo da u svim zanimanjima HRSTO-a prevladavaju osobe u dobnoj skupini od 45 do 64 godine, a najmanje zaposlenih ima u dobnoj skupini od 25 do 34 godine. Najmlađa promatrana dobna skupina od 25 do 34 godine najviše je zastupljena u kategoriji zanimanja Znanstvenici, inženjeri i stručnjaci (34,1%). Ako se promatra distribucija populacije HRSTO prema zanimanjima, vidljivo je da je gotovo polovica osoba (49,7%) zaposlena u kategoriji zanimanja Znanstvenici, inženjeri i stručnjaci, za razliku od 71,7% osoba zaposlenih u tom zanimanju u populaciji HRSTC.

Human resources in science and technology by occupation (HRSTO) is a group of people that actively participate in science, technological development and innovation. This graph shows that persons in the 45 to 64 age group prevailed in all HRSTO occupations, while the smallest number of persons was recorded in the 25 to 34 age group. The youngest age group, 25 to 34, was the most prevalent in the Professionals category, with 34.1%. The distribution of the HRSTO population by occupation shows that nearly half of persons (49.7%) were employed as Professionals, as opposed to 71.7% of persons employed as Professionals in the HRSTC population.

G-7. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTO PREMA ZANIMANJU U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTO, BY OCCUPATION, 2020



G-8. LJUDSKI POTENCIJALI U ZNANOSTI I TEHNOLOGIJI HRSTC PREMA ZANIMANJU U 2020.
HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY HRSTC, BY OCCUPATION, 2020



Ljudski potencijali u znanosti i tehnologiji prema obrazovanju i zanimanju (HRSTC) skupina je ljudi koji imaju tercijarno obrazovanje te rade u zanimanjima znanosti i tehnologije. Ta skupina veoma je važna za razvoj znanja i inovacija. Udio žena u populaciji HRSTC jest 58,1%. Većinu zaposlenih u aktivnostima znanosti i tehnologije čine znanstvenici, inženjeri i stručnjaci (71,7%), zatim slijede tehničari i stručni suradnici (20,0%), dok administrativni i komercijalni direktori, direktori proizvodnje i specijaliziranih usluga te direktori u turizmu, ugostiteljstvu, trgovini na malo i drugim uslužnim djelatnostima čine 8,3%. Nešto više od 68,0% osoba u populaciji HRSTC ima postignuto obrazovanje na razini ISCED-a 7.

Human resources in science and technology by education and occupation (HRSTC) is a group of persons who have successfully completed a university-level education and are employed in science and technology occupations. This group is crucial for the development of knowledge and innovation. The share of women in the HRSTC population was 58.1%. The majority of persons employed in science and technology area were professionals (71.7%), followed by technicians and associate professionals (20.0%), while administrative and commercial managers, production and specialised services managers and hospitality, retail and other services managers accounted for 8.3%. Just over 68.0% of persons in the HRSTC population have successfully completed education at the ISCED level 7.

METODOLOŠKA OBJAŠNJENJA

Izvori podataka

Podaci prikazani u ovom Priopćenju dio su rezultata Ankete o radnoj snazi[1)] Metodologija Ankete o radnoj snazi potpuno je usklađena s onom koju propisuje Statistički ured Europske unije (Eurostat) te omogućuje usporedbu sa svim zemljama članicama Europske unije.

Obuhvat i usporedivost

Od početka 2014. koristi se okvir za uzorak koji se temelji na podacima iz Popisa stanovništva, kućanstava i stanova 2011. godine.

Prema metodologiji Ankete, ne obuhvaća se institucionalno stanovništvo (domovi, samostani, bolnice za trajni smještaj osoba i slično).

Stopa neodgovora za 2020. iznosila je 43,0%, a stopa odbijanja 24,1%.

Za potrebe analize podataka o ljudskim potencijalima u znanosti i tehnologiji u obuhvat su uključene osobe u dobi od 25 do 64 godine.

Definicije i objašnjenja

Za analizu i prikazivanje podataka o ljudskim potencijalima u znanosti i tehnologiji koriste se harmonizirani koncepti, metode i definicije koje proizlaze iz Priručnika o mjerenju ljudskih potencijala u znanosti i tehnologiji, Priručnika Canberra[2)] (OECD, UNESCO, Međunarodna organizacija rada, Glavna uprava Europske komisije za istraživanje i inovacije te Eurostat).

Priručnik Canberra ljudske potencijale s visokorazvijenim vještinama opisuje kao nužne za razvoj i prijenos znanja te kao glavnu vezu između tehnološkog napretka i ekonomskog rasta i društvenog razvoja. Cilj je istražiti temeljna obilježja osoba, odnosno dijela radne snage s najrazvijenijim vještinama i najvećim potencijalom pridonijeti društvu temeljenu na znanju.

Radi dobivanja potpune slike ponude i potražnje za HRST-om, definicija se temelji na dvjema dimenzijama, kvalifikaciji i zanimanju. Kvalifikacijska os odnosi se na ponudu HRST-a, tj. na broj ljudi koji su trenutačno ili potencijalno raspoloživi za rad na određenoj razini. Potražnja za HRST-om, tj. brojem ljudi koji su zapravo bili potrebni u aktivnostima znanosti i tehnologije, na određenoj razini u vezi je s dimenzijom zanimanja. S obzirom na to da potražnja nije uvijek u skladu s ponudom i da se vještine mogu naći izvan formalnog sustava obrazovanja, predlaže se sljedeća kombinirana definicija.

Prema Priručniku Canberra, ljudski potencijali u znanosti i tehnologiji (HRST) definiraju se kao osobe koje ispunjavaju barem jedan od sljedećih kriterija:

- prema **obrazovanju** (**HRSTE**) – osobe koje imaju uspješno završeno tercijarno obrazovanje (ISCED 5, 6, 7 ili 8)

- prema **zanimanju** (**HRSTO**) – osobe koje su zaposlene u zanimanjima znanosti i tehnologije kao znanstvenici, inženjeri i stručnjaci, tehničari i stručni suradnici i direktori.

Skupina koja zadovoljava oba navedena kriterija naziva se **jezgra HRST-a (HRST "core", HRSTC)**.

U obrazovnom sustavu Republike Hrvatske razine obrazovanja koje su uključene u analizu podataka o ljudskim potencijalima u znanosti i tehnologiji prema obrazovanju (HRSTE) jesu:

- prema predbolonjskom programu
  - stručni dodiplomski studij (ISCED – 5. razina)
  - sveučilišni dodiplomski studij (ISCED – 7. razina)

1) Za detaljnija metodološka objašnjenja Ankete o radnoj snazi, molimo, pogledajte Priopćenje Aktivno stanovništvo u Republici Hrvatskoj u 2020., brojeve 9.2.6/1., 9.2.6/2., 9.2.6/3., 9.2.6/4. i 9.2.7. na mrežnim stranicama Državnog zavoda za statistiku www.dzs.hr.
2) Mjerenje ljudskih potencijala u znanosti i tehnologiji – priručnik Canberra – peti je u obitelji priručnika Frascati o mjerenju znanstvenih i tehnoloških aktivnosti.

NOTES ON METHODOLOGY

Data sources

Data in this First Release are a part of the Labour Force Survey results[1)]. The methodology for the Survey is fully harmonised with the one prescribed by the Statistical Office of the European Union (Eurostat) and, therefore, enables the comparison of the Republic of Croatia with all EU Member States.

Coverage and comparability

Since the beginning of 2014, a sample frame based on the data from the Census of Population, Households and Dwellings in 2011 has been in use.

According to the methodology of the Survey, the population residing in institutions (such as homes, convents, hospitals for long-term treatments, etc.) is not included in the sample frame.

The overall non-response rate for 2020 was 43.0% and the refusal rate was 24.1%.

For the purposes of analysing data on human resources in science and technology, the coverage includes persons aged 25 to 64.

Definitions and explanations

The harmonised concepts, methods and definitions used to analyse and report data on human resources in science and technology originate from the Manual on the Measurement of Human Resources devoted to Science and Technology, the Canberra Manual[2)] (OECD, UNESCO, International Labour Organisation, the European Commission Directorate-General for Research and Innovation and the Eurostat).

The Canberra Manual describes highly skilled human resources as essential for the development and transfer of knowledge and as a crucial link between technological advancement, economic growth and social development. The aim is to explore basic characteristics of the part of the labour force with highly developed skills and the largest potential to contribute to the knowledge-based society.

In order to obtain the full picture of demand for and supply of human resources in science and technology, the definition is based on two aspects, qualification and occupation. The qualification aspect presents the supply of human resources in science and technology, that is, the number of persons currently or potentially available for work at a particular level. The demand for human resources in science and technology, that is, the number of persons actually needed in science and technology activities at a particular level, is connected with the occupation aspect. Because demand does not always match supply and because skills can be obtained outside the formal education system, the following combined definition is proposed.

The Canberra Manual defines human resources in science and technology as persons fulfilling at least one of the following two conditions:

- *human resources by **education** (**HRSTE**): persons who have successfully completed a university-level education (ISCED 5, 6, 7 or 8)*
- *human resources by **occupation (HRSTO**): persons who are employed in science and technology occupations as professionals, technicians and associate professionals and managers.*

*The group that fulfils both criteria is called **HRST core (HRSTC).***

In the education system of the Republic of Croatia, the levels of education that we need for the analysis of data on human resources in science and technology by education (HRSTE) are as follows:

- according to the pre-Bologna programme
  - *Undergraduate professional study (ISCED level 5)*
  - *Undergraduate university study (ISCED level 7)*

1) For more detailed methodological explanations of the Labour Force Survey, please see the First Release Labour Force in the Republic of Croatia, 2020, numbers 9.2.6/1, 9.2.6/2, 9.2.6/3, 9.2.6/4 and 9.2.7. on the web site of the Croatian Bureau of Statistics, www.dzs.hr
2) Human Resources in Science and Technology – the Canberra Manual – is the fifth manual in the Frascati family on the measurement of scientific and technological activities.

- prema bolonjskom programu
  - kratki stručni studij (ISCED – 5. razina)
  - prediplomski stručni studij (ISCED – 6. razina)
  - specijalistički diplomski stručni studij (ISCED – 7. razina)
  - preddiplomski sveučilišni studij (ISCED – 6. razina)
  - diplomski sveučilišni studij (ISCED – 7. razina)
  - integrirani preddiplomski i diplomski studij (ISCED – 7. razina)

- doktorat znanosti (ISCED – 8. razina)

Skupine zanimanja koje su prema Priručniku Canberra uvrštene u HRSTO jesu:

- NKZ 10. rod 2: (znanstvenici, inženjeri i stručnjaci) – zanimanja koja povećavaju opseg postojećih znanja, primjenjuju znanstvene ili umjetničke spoznaje i teorije, na sustavan način prenose navedena znanja ili kombiniraju navedene djelatnosti

- NKZ 10. rod 3: (tehničari i stručni suradnici) – zanimanja koja obuhvaćaju tehničke i srodne poslove u istraživanju i primjeni znanstvenih ili umjetničkih spoznaja i operativnih metoda te poslove u državnoj upravi

- NKZ 10. vrste 12, 13 i 14: (administrativni i komercijalni direktori, direktori proizvodnje i specijaliziranih usluga, direktori u turizmu, ugostiteljstvu, trgovini na malo i drugim uslužnim djelatnostima).

Upotrijebljene klasifikacije

a) Međunarodna standardna klasifikacija obrazovanja ISCED 2011, upotrijebljena je pri šifriranju obilježja postignutog obrazovanja.

b) Nacionalna klasifikacija zanimanja 2010. (NKZ 10.), usporediva s međunarodnom klasifikacijom zanimanja ISCO-08, upotrijebljena je pri šifriranju obilježja zanimanja.

Kratice

OECD	Organizacija za ekonomsku suradnju i razvoj
UNESCO	Organizacija Ujedinjenih naroda za obrazovanje, znanost i kulturu

- according to the Bologna programme
  - *Professional short-term study (ISCED level 5)*
  - *Undergraduate professional study (ISCED level 6)*
  - *Specialist professional graduate study (ISCED level 7)*
  - *Undergraduate university study (ISCED level 6)*
  - *Graduate university study (ISCED level 7)*
  - *Integrated undergraduate and graduate study (ISCED level 7)*

- Doctorate of science (ISCED level 8)

The Canberra Manual recommends the identification of certain occupation groups as those included in the HRSTO, as follows:

- NKZ 10, major group 2: (professionals) – occupations that increase the existing stock of knowledge, apply scientific or artistic concepts and theories and systematically transfer the mentioned knowledge or combine the mentioned activities.

- NKZ 10, major group 3: (technicians and associate professionals) – occupations that cover mostly technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods as well as state administration tasks.

- NKZ 10, groups 12, 13 and 14: (administrative and commercial managers, production and specialised services managers, hospitality, retail and other services managers).

Classifications used:

a) The International Standard Classification of Education ISCED 2011 was used in coding the education variable.

b) The National Classification of Occupations, NKZ-10, comparable to the International Standard Classification of Occupations ISCO-08, was used in coding the occupations.

Abbreviations

EU	*European Union*
OECD	*Organisation for Economic Cooperation and Development*
UNESCO	*United Nations Educational, Scientific and Cultural Organization*

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