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Horvat, Jelena; Klačmer Čalopa, Marina; Sobodić, Aleksandra

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Analysis of human resources in science and technology in ICT companies – case of Croatia

Jelena Horvat *jelena.horvat@foi.hr*
Faculty of Organization and Informatics
University of Zagreb, Varaždin, Croatia

Marina Klačmer Čalopa *marina.klacmer@foi.hr*
Faculty of Organization and Informatics
University of Zagreb, Varaždin, Croatia

Aleksandra Sobodić *aleksandra.sobodic@ foi.hr*
Faculty of Organization and Informatics
University of Zagreb, Varaždin, Croatia

Abstract

This paper integrates theories and findings from the level of tertiary educated workforce, the human resources in science and technology and skills that are desirable in employees from the information and communication technologies (ICT) sector. It is important to examine the real situation on the labor market in the ICT sector, which is often referred as the key to overcoming the crisis and the future of national economy. Basic statistical elements, upon which to predict future demand for human resources in science and technology (HRST), are people who enter tertiary level of education (inputs) or are already in the system (throughputs), but until graduation are not considered HRST's (outputs). Analysis is based on a sample of 56 small companies in ICT sector in Croatia. This paper presents the overview of the situations of human resources in small companies ICT sector in Croatia. Existing literature on HRST, employee's skills and ICT sector is reviewed in the light of this analysis, in order to better understand current employment structure and desirable competencies of future employees of small companies in the ICT sector in Croatia.
Keywords: Human resources in science and technology, ICT skills, small companies in the ICT sector

1. Introduction

Main goal of every company is to succeed either in selling products or in providing service sufficiently to cover their costs. When the survival and success of a company depends on skills and qualifications of their employees, or just on a handful of people, the market becomes a battlefield and aspects of success take a new turn. Environment is changing rapidly and in order to survive, companies have to be more flexible and able to answer demands of the environment as they come. Presuming that one of the factors for internal competences are human resources, then in order to insure the competitiveness, employees need to suit the company through their skills and education level.

Human resources (HR) are key components of every organization, representing total knowledge, talent, attitude, creative ability, aptitude and belief of an individual involved in the affairs of an organization [9]. For surviving the changes in environment, flexible and good structure of employees and their capabilities, as well as good organization of HR departments, is a *must have*. Management and human resource development should be one of the main components of long-term strategy of each company. It is frequently stressed that education and training systems are the heart of the coming changes [18].

Research presented in this paper focuses on economically active population that is employed in ICT sector and seeks to define the level of tertiary educated workforce (human resources in science and technology) in the ICT sector in Croatia. Paper also explores ICT skills that are desirable in employees from the ICT sector and examines the real situation on the labor market in ICT sector, which is often referred to as the key to overcoming the crisis and the future of the national economy.

Main research objective of this paper is to examine educated human resources in business practices of small companies from ICT sector: share (%) of human resources in ICT sector based on the level of education; share (%) of human resources in ICT sector based on full employment time; share (%) of human resources in the ICT sector according to age; the importance of specific IT knowledge and skills in the ICT sector. Collected data from small companies from ICT sector in Croatia was analyzed using descriptive statistics and was supported by graphical representation of the surveyed variables. Prior to that, analysis of data from the Central Bureau of Statistics, that were relevant to the topic of this paper, was made. Using deduction and generalization method, certain conclusions regarding the data processed by descriptive statistics were made. Finally, in order to demonstrate statistical relationship between the variables, the correlations were conducted, on basis of previously defined properties of the sample.

International, national and regional authorities study the HRST considering the present economic situation. They are trying to plan and direct specific industry segments such as education system and make decisions that would be in line with European standards. ICT has been recognized as a very useful tool in achieving mission, vision and strategies of organizations and it enables organization to meet general and specific business needs. The question whether ICT is necessary, is no longer being asked, on the contrary, the one that is asked is how to implement IT and in which extent should IT be part of a business process.

2. Evolution of the term ‘human resources’

Globalization leads to ‘*the circulation of people, goods and information, thereby linking regions and affecting interaction*’ [14]. In fact, image of the world is transformed in terms of economic, social, technological and political changes. In knowledge society, traditional economic resources like land, labor and capital have been replaced by knowledge, where the emphasis is set on education, research and innovation. It often comes to confusion due to a wide range of equivalent terms like human resources, human potentials, human capital, etc. Given that humans are *the only creative element of every organization* [4, 12] and human potentials are impossible to copy, it is very important to recognize the concept of human resources, which admits a superior intellectual ability and power of speech articulation of a company’s’ resources. The expression *the human resources* is according to some critics humiliating for people, because they are equated with the object of management, while supporters point out that this term has ceased in practice by which all other resources are more important than people [15]. According to Vujic [24] human capital ‘is creative application of knowledge in every creative activity. It is defined through qualities, knowledge, skills, creativity, experience, motivation and business culture, human relations, and cooperation with business partners.’

Wright, McMahan and McWilliams [27] define human resources as a pool of human capital that is controlled by the company and is in a direct employment and relationship with the company’s management. They also state that there are two aspects of human resources. First aspect focuses on knowledge, skills and abilities (KSA) of individuals who form the organization, while the second aspect relates to characteristics of individuals, which do not bring value to the company unless they are expressed through the workers’ behavior. In fact, both approaches are very important in understanding interaction between workers’ competencies and their behavior. Accordingly, the KSA is necessary but not sufficient in lining employee’s behavior with corporate objectives. Although employee’s behavior is a direct way of achieving company’s strategy, however, employees must have competencies, the KSA, which are necessary in order to show certain behaviors.

1.1. Qualified vs. skilled worker

Various terms are used when discussing possible shortages of highly qualified personnel or their international mobility: highly skilled workers, qualified personnel, human resources in science and technology, scientists and engineers, IT workers, '*brains'* (in '*brain drain'*, '*brain gain'* or '*brain circulation'*), etc. [3]. Issue that presents itself is the difference between *qualified* and *skilled* worker. Term '*skill*' refers to qualifications, which are needed to perform certain tasks, and it reflects the level of human capital in labor markets. Skills are multidimensional, due to the fact that most jobs require a multitude of various skills to perform tasks adequately, ranging from physical abilities like eye-hand co-ordination, dexterity and strength, to cognitive like analytic and synthetic reasoning, numerical and verbal abilities and interpersonal like supervisory and leadership [25]. International standard classification states that the term '*qualified*' stands for formal qualification and corresponds to an existing and widely used international classification [25]. *Highly qualified* refers to a certain level of education or formal qualification and may therefore be differentiated from 'qualified'. Education is categorized by years of schooling or by the final degree obtained. But it does not take into account *on-the-job* learning and skills which are associated with the use of new technology [3].

3. Human Resources in Sciences and Technology

Importance of science and technology in today's information society is inevitably presented in the fact that around the world strategies are developed, which have impact on persons profile but also on entire system of education, through which it is shaped and defined. In a broad sense science *is knowledge and the search for knowledge based on scientific methods* [19], while technology can be defined as 'the application of science' [2].

Combining Science and Technology (S&T) and human resources (HR), the key ingredients of competitiveness and economic development are obtained. 'Human Resources in Science and Technology' [17] was created for the purpose of Canberra Manual[1] to describe specifically educated workforce or workforce with special abilities. HRST in a broader sense refers to an understanding of supply and demand in labor market of individuals who are highly qualified in the field of science and technology. From a narrow point of view of the Canberra Manual, HRST refers to the population of a country that is economically active in the age group of 15-74 years. However, there are two aspects that are used for the identification of human resources in science and technology, namely [17]:

- **occupation** (people employed in activities of science and technology at appropriate level)
- **educational attainment - qualifications** (people with formal qualifications which enable them to be employed at these levels)

Difference between people who belong to HRST due to their profession and the ones that belong to it due to their educational attainment, is that those who are currently working in the field of S&T, but have no appropriate formal qualification, as soon as they leave their job or retire and become economically inactive, they lose the status of HRST's. Hence, people who have completed tertiary education levels have HRST status up to the end of their life, regardless of their occupation. HRST *reserves* [17] are people who have successfully completed the process of tertiary education, which means that they are formally qualified in the field of science and technology, but do not work in that field.

1.2. HRST according to occupation and educational attainment

In order to conduct a research of HRST in the ICT sector it is necessary to take into account the International Standard Classification of Education, ISCED - 97, which includes seven

[1] The Manual is intended to provide guidelines for the measurement of Human Resources devoted to Science and Technology (HRST) and the analysis of such data.

categories of education and is comparable with the International Standard Classification of Education, used for education statistics at the national level [6]. According to the definition, education is an *organized and sustained communication for learning* [23]. Structure of education system and level of education in ISCED classification are shown in Table 1.

Education system	**Level of education**
Preschool education	0
Primary school education (lower classes)	1
Primary school education (higher classes)	2
Secondary school education	3
Post-secondary education	4
Higher education, Master's Degree	**5**
Doctorate (Ph.D.)	**6**

Table 1. Structure of the education system and the level of education (propisi.hr)

It is necessary to consider presented levels of professional education for purpose of analyzing HRST in Croatia [6]:

- ISCED 5 - tertiary education includes college and university education, corresponding to 5 ISCED 97
- ISCED 5.1 - Undergraduate and postgraduate (master's degree), corresponding to sublevel 5A ISCED 97
- ISCED 5.2. - Higher education and professional studies, corresponding to sublevel 5B ISCED 97
- ISCED 6 - Ph.D., corresponding to level 6 ISCED 97

HRST can be divided into two main categories: university level and technical level. Difference between the two is in the level of skills and education [17]. Upon successfully completing university education and receiving the baccalaureate or master's level of education, it is considered that an individual is at the university level of HRST, while each lower level is a technical level of HRST. Therefore, people who do not have above-mentioned qualifications may be included in these categories based on their occupation. These people often have skills that they have acquired outside of formal education system. Given these differences, it is necessary to provide following definition of a university level and a technical level of HRST [17]:

(1) University-level HRST are people who fulfill one of following conditions:
   a) successfully completed education in S&T at the third level of the type that results in a baccalaureate or master's level degree; or
   b) not formally qualified according to the above definition, but are employed in the S&T occupation where above qualifications are normally required.

(2) Technician-level HRST are people who fulfill one of the following conditions:
   a) successfully completed education at the third level of the type that results in an award, which is not equivalent to the first or higher university degree, in an S&T field of study (other than those employed in occupations normally requiring a higher qualification); or
   b) not formally qualified as above, but employed in an S&T occupation where the above qualifications are normally required.

To conclude, there is a combination of criteria including education and occupation and there are two categories either at the university or at the technical level of HRST. There are people who are qualified on the technical level, but are working professionally at the university level and then there are people who are qualified at the university level but are occupied on a technical level [17].

4. HRST in Croatia

According to data from the Central Bureau of Statistics 2011, when observing the level of education and age groups in Croatia, people prevailing are those between 45 and 64 years who have a completed tertiary education ISCED [6]. Previously, in 2010, the most common level of education (ISCED 5) was between 50 and 59 years (23.89%), while the lowest number of employees was in age group of 18-39 years (Central Bureau of Statistics, 2011). Full-time employment in Croatia is considered a 40-hour working week, and 98.3% of people are employed that way in the field of S&T, while only 1.7% are employed less than full-time. In addition, in field of S&T, according to statistics from the year 2011, more than a half of workers are women, 53.8% [6]. As for the year 2010, the equivalent of working time was the same, but people, employed for full-time in the field of S&T make 90.34% of the working force, whereas only 9.66% were employed less than full-time.

People employed in science and technology are mostly scientists and experts (60.1%), followed by engineers, technicians and associate professionals (29.2%) [6]. Also, in the previous year (2010), the representation of professionals and scientists was about the same, (59.5%), while engineers, technicians and related occupations were around 30.4% and directors about 10.14% [5]. Most common age group employed in various occupations in the field of S&T is between 45 and 64 years in year 2011 [6]. Detailed age groups from 2010 [5] show that human employees in S&T were mainly in age group between 50 and 59 years, while the least number of people employed was in the age group between 18 and 29 years.

1.3. Previous studies of ICT sector in Croatia

OECD member countries have adopted an internationally accepted definition of the ICT sector, which is based on International Standard Industrial Classification of All Economic Activities. According to them 'The ICT sector is a combination of manufacturing and service activities which electronically receive, transmit and display data and information' (OECD, 2002). Investing in ICT raises the ICT infrastructure and enables usage of more productive equipment and software in business. Through investments, the availability of capital and labor productivity is increased [10]. Existence of a sector, which produces ICT goods and services, contributes to economic growth, employment and export. Moreover, a strong ICT sector may help companies that want to use technology, since location of producing companies has advantages when developing ICT applications for specific purposes (Dryden, 2003).

ICT industry is growing faster than other segments of Croatian economy and there are areas of innovation and entrepreneurship [7]. However, the biggest problem occurs in area of export, where Croatia exported computer and information services, generating 117.2 million Euros, and communications services generating 182.7 million Euros, in 2009. When compared to the developed countries, such as Ireland, Denmark and Finland, Croatia lags behind [12].

Several scientific studies have dealt with issues of those economic sectors that are intensive users of ICT. Most of these sectors are located in service sector such as industry dealing with finance, business services and distribution. There is evidence, especially in United States and Australia, that sectors which mostly invest in ICT experience an increase in overall efficiency of labor and capital utilization, which leads to growth of productivity [10]. When comparing the readiness of ICT usages for the 2012, the leading countries were Sweden, Singapore and Finland. Croatia was in 45th place out of 142 countries, according to the annual IT survey from the World Economic Forum (WEF). In line with latest research of WEF in ICT, competitiveness of Croatia has fallen to the 51st position in year 2013 [27].

It is important to notice the position of Croatian business and innovation environment and, in particular, gross enrollment ratio for tertiary education, which is in the 50th place in range of 144 countries. However, procurement index of advanced technology by government puts Croatia at the 129th position. As far as the readiness goes, Croatia is in 99th place regarding the quality of education system and in 26th place when comparing the quality of math and science education. Level of technology absorption in Croatian companies is ranked at 77th position, capacity for innovation at 72th and the lowest result examined was in staff training, according

to which Croatia is located at 124th position of 144 surveyed countries (World Economic Forum 2013, p. 172).

Every year a survey of needs and opportunities of ICT experts in Croatia is conducted. Basically 63% of companies intended to hire new ICT staff and 93% have no plans to reduce the number of employees of ICT personnel in 2013. As for higher education personnel, 76% of respondents consider a lack of highly educated staff, but also 85% of companies stressed out that they consider employing educated people with no previous work experience [20]. Most wanted ICT job in Croatia is the software engineer, followed by a business analyst, system engineer and expert in web development and multimedia [21].

Disappointing fact is that only 15% of ICT companies systematically organize professional practice and 66% of companies in Croatia accept the students on practice [20]. Demands for specific competencies in ICT in the coming years in Croatia are [20]: Development of applications for mobile devices; Data Warehousing and Business Intelligence; Computer security, forensics and cryptography; Web design and Internet programming; Advanced programming techniques; Networking technology and infrastructure and others like development and processing of 3D content, development of multimedia and computer games, etc.

5. Empirical research

As mentioned above, the goal of this paper is to present findings on education and skills classification desirable for ICT sector, which have been explained in previous chapters. Main goal of this paper is to analyze, through an empirical research on small companies, the level of tertiary educated workforce, the human resources in science and technology, in ICT sector in Croatia. Below, research questions are presented as well as empirical research methodology and data analysis results.

5.1. Research questions

Primary data collection was conducted through self-administrated online questionnaires that were sent by email to small companies in ICT sector in Croatia. Based on previously collected and analyzed research, as well as on the defined set of research problems, several research questions were formed.

Research questions:

1. How many of small companies in ICT sector have an HR department?
2. Which skills are appreciated in potential employees of small companies in ICT sector?
3. Which ICT knowledge and skills are required from potential employees in small companies in the ICT sector?
4. Which IT certifications do future employees of small companies in the ICT sector value?

Below methodology is presented, as well as the sample and data analysis regarding educational level in small Croatian companies in the ICT sector.

6. Sample and procedures

Small companies in ICT sector were chosen according to their main activity ‘Information and communication’ from the Business Register of the Croatian Chamber of Commerce (CCC). Small companies are considered those employing up to 50 employees during the calendar year, according to recommendation of the Law on Accounting[2].

[2]Small size companies: Number of employees: < 50; Nett profit (in HRK): 65.000.000,00; Assets (in HRK): 32.500.000,00

Online survey was sent to 757 companies and fully answered questionnaires were received from 56 companies, which means a 7.4% response rate. A sample of 56 companies is representative as it contains all the features of population from which the sample was taken. Accordingly, all small ICT companies with less than 50 employees with main activity 'Information and communication' were initially included in the survey.

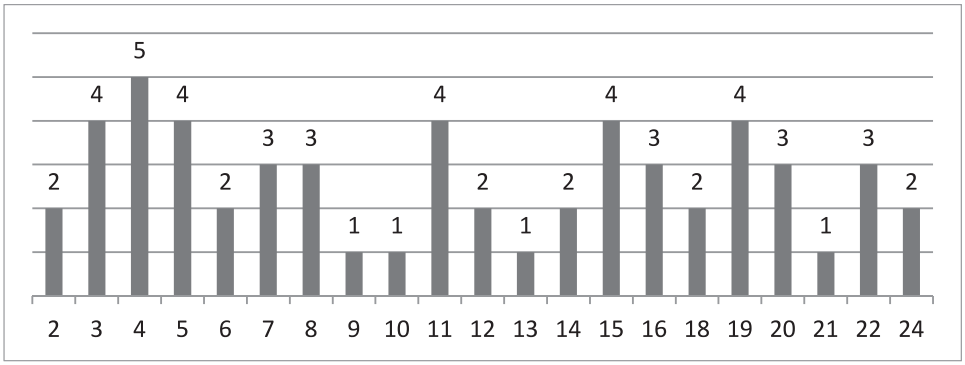


Figure 1. Distribution of companies by age

Company size is often one of the criteria that causes lack of some specific resources, like financial, organizational or even human resources and that is the reason why organizations cannot justify HR professionals in company. This could especially be noticed in small and medium sized companies [13]. Some large companies are not spared the lack of professional HR management. In addition, HRM procedures require considerable development costs. That is one reason why the companies' size is positively related to adoption of many HR instruments. From that point of view, small and medium sized companies are less likely to use formal HRM practices than large companies do [8]. It is assumed that older companies (operating for more than 10 years) have an elaborated function of HRM. For the purpose of this research and better understanding of results, following separation of companies according to age was used:

- Company age 0-5 years are classified as start-ups,
- From 6 to 10 year are mature companies, and
- From 11 and onwards are classified as old companies.

Figure 1 shows the distribution of the companies by their age. Only 12% of companies have an HR department and a person responsible for management of HR, which is supported by literature [13]. Following the research question *„How many of small companies in ICT sector have an HR department*?" analysis of individual results showed that there are no regularities regarding the number of employees and an institutionalized HR department. Therefore, it is presumed that it depends on individual needs and preferences of the company

7. Data analysis

Respondents, in most cases (64%) were directors and owners of small companies and a few sales managers, IT professionals, prentice, sales and marketing assistants, general business managers and other. Half of the respondents (55%) have a university degree, 20% have higher qualifications, 14% have secondary education and 11% have postgraduate doctoral or a specialist study. Due to the fact that that this research is focused on small companies it is presumed that all employees are acquainted with the state and business environment, and therefore have given correct and accurate information.

Equivalent of full-time in Croatia is 40 hours a week, and according to research, 95% of respondents are employed full-time in the ICT sector. According to the sex of employees, which is 503 employees in total in 56 surveyed companies, 137 are women.

According to total number of employees (jointly in all surveyed companies), which is 503 employees in total, 54% of employees are scientists, engineers and experts in their filed and

18% of employees are on the position of technicians and assistants 18%. Most of the employees are between age of 30 and 39 years.

Although, every year an increasing number of students of tertiary education graduates, only 46% of tertiary educated persons are located in ICT sector of small companies. There are multiple reasons for that, one of them being the fact that most people, in the fall into the age group 30 to 39 years. A positive trend of increasing higher education has been evident just in the past few years, so the employees mostly have completed certification and work experience Also, a conventional business practice, due to cost reasons, is the employment of low-educated persons, which are often very limited in knowledge.

In estimating the importance of skills in ICT companies (*"Which skills are appreciated in potential employees of small companies in ICT sector?"*) according to the number of responses from current or potential employees, companies presume that it is important to acquire: critical thinking skills and problem solving ability, teamwork, high motivation, ability to learn and high level of respect of work ethics. Results show a strong correlation between companies' need for presentation and communication skills (0.509), negotiation and communication skills (0.637), negotiation and presentation skills (0.750), sales and communication skills (0.513), sales and presentation skills (0.618), sales and negotiation skills (0.717), critical thinking skills and problem solving and teamwork (0.585), high motivation and teamwork (0.695), high motivation and skill of critical thinking and problem solving (0.692), ability to learn quickly and critical thinking and problem solving skills (0.577), ability to learn and respect the work ethic (0.589) and the ability to learn quickly and high motivation (0.689). Results also showed that the most important skills of the potential employee are negotiation and presentation skills. Communication, presentation, negotiation and sales skills are not among most frequent competencies that employees should have in ICT sector, but they are not irrelevant.

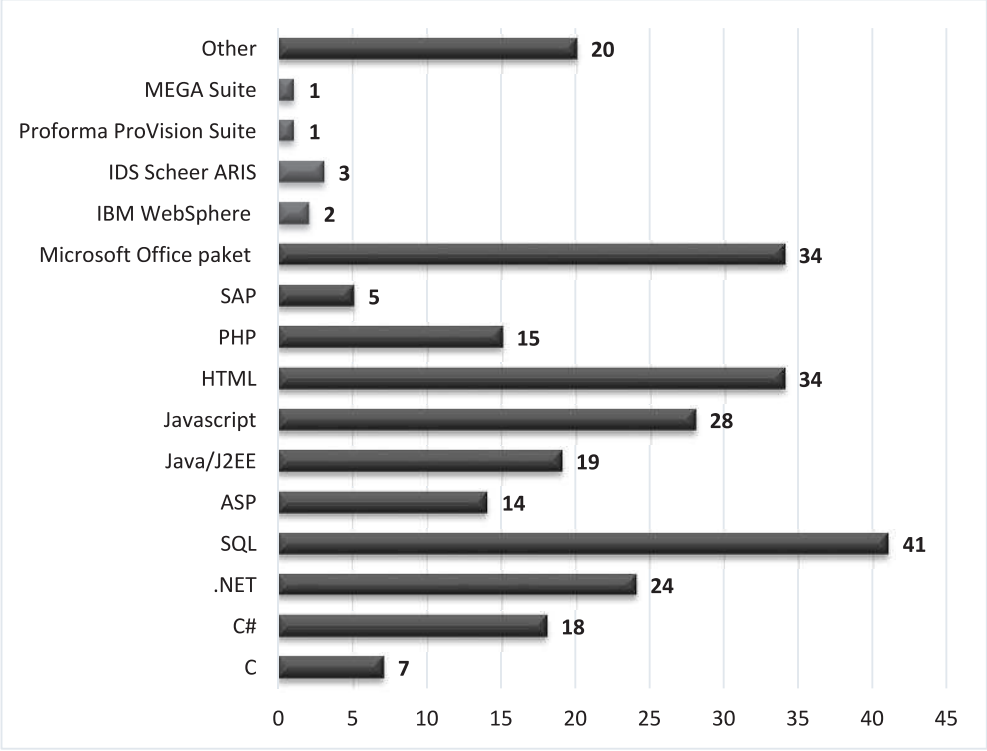


Figure 2. Importance of ICT knowledge and skills

When asked which foreign languages are essential for operation of their businesses, 80% of companies stated that English language is the most important, for 17% of respondents it was German, and French scored with only 1%.

ICT knowledge and skills appreciated by current or potential employees in ICT companies are shown in Figure 2. This answers the research question regarding; '*Which ICT knowledge and skills are required from potential employees in small companies in the ICT sector*?' Observing the necessary knowledge of IT, in first place and most needed is SQL with 41 response, then Microsoft Office package with 34 response, HTML, NET and others. Other IT skills mentioned by companies are: Oracle DB, MS Visio, MS Project, AutoCAD, Apex, Visual Basic, ERP, XML, VMware, Delphi, Microsoft Dynamic AX, EpicorEpicor, DeltekMaconomy, iOS, Android, Windows 8 development platform, Ruby on Rails, Data Recovery, WinHex, PC300, RStudio andFlex.

Importance of IT certification for companies was investigated in order to answer the research question: *Which IT certifications are valued by future employees of small companies in the ICT sector*? Analysis showed that Microsoft certifications MCITP/MCTS (*Microsoft Certified IT Professional/Microsoft Certified Technology Specialist*) holds the top spot, followed by PMP (Project Management Professional) and Cisco certifications CCNA/CCNP/CCIE (Cisco Certified Network Associate/CCN Professional/CC Internetwork Expert). Other important certificates, according to respondents are: MCPD (Microsoft Certified Professional Developer), MCSA (Microsoft Certified Solutions Associate), MCSE (Microsoft Certified Solutions Expert), CTS (Certified Technology Specialist), DCSE, AS/400, Progress and Esri Dr.

8. Discussion and conclusion

In terms of uncertain and dynamic environment only real answer to question of competitive advantage are human resources. Other capital, except the intellectual, cannot give original and prompt response to radical change outside and within the company. Lately more newspaper articles, advertisements and others show how to make profit; but which is real recipe for success? Definitely, the answer lies in higher education of individual, but is it really enough? The latest research, as well as common sense would state, knowledge is only enough for a short term. However, what matters is the human activity, which together with knowledge can create remarkable positive change, even on global level. Capitalist society has created consumerism in which people are objects that should boost consumption.

Results of the empirical research in small companies from the ICT sector in Croatia showed that although only 12% of companies have an HR department and a person responsible for management of HR no regularities regarding the number of employees and institutionalized HR department were noticed. Most of the employees in researched companies are between age of 30 and 39 years, and more than a half of them are scientists, engineers and experts in their filed. Most important and desired skills of the employee in ICT sector are negotiation and presentation skills. No correlation between the age of the company and existence of an HR department was detected. Results also showed that the existence of HR department has influence on the perception of desirable 'soft' skills of their employees.

Observing the survey results, one should bear in mind potential drawbacks of this research. Research limitations are primarily related to the number of respondents (response rate 7%), even though obtained data is representative and it describes the target population well. Data on the number of small ICT companies is based solely on information gathered through own search of Business Register of the Croatian Chamber of Commerce. Another limitation is lack of previously conducted studies in the area of human resources in science and technology.

Primarily, results show that there is no correlation between age and existence of an HR department and no regularity has been recovered.

References

[1] Adizes, I. *The Corporate Lifecycle*, http://www.adizes.com/corporate_lifecycle_overview.html, (downloaded May 2. 2014)

[2] Andric, K. *Što je tehnologija*, http://www.zpr.fer.hr/static/erg/2005/andric/index.html (downloaded April 03.2014)

[3] Auriol, L., Sexton, J. *Human resources in science and technology: measurement issues and international mobility*. International Mobility of the Highly Skilled 13–39; 2002.; http://pesona.mmu.edu.my/~chtan/Seminar/9202011E.pdf. downloaded April 03.2014

[4] Bahtijarevic-Siber, F. *Management ljudskih potencijala*. Golden marketing, 1999.

[5] Central Bureau of Statistics, *Statistical Yearbook of the Republic of Croatia 2010*, http://www.dzs.hr/Hrv_Eng/ljetopis/2003/metodologije/27_436_met.pdf (downloaded April 03.2014)

[6] Central Bureau of Statistics, *Statistical Yearbook of the Republic of Croatia 2011*, http://www.dzs.hr/Hrv_Eng/ljetopis/2003/metodologije/27_436_met.pdf (downloaded April 03.2014)

[7] Croatian Chamber of Commerce (2011), Izazovi ICT industrije u Hrvatskoj: Predstavljanje Analize hrvatske ICT industrije 1999. – 2009, http://www.hgk.hr/djelatnost/gosp_informatika/izazovi-ict-industrije-u-hrvatskoj-predstavljanje-analize-hrvatske-ict-industrije-1999-2009 (downloaded April 03.2014)

[8] De Kok, J., den Hartog, D. *Is human resource management profitable for small firms*? EIM SCALES Scientific Analysis of Entrepreneurship and SMEs Zoetermeer, February 2006.

[9] Dhamija, P., *E-recruitment: a roadmap towards e-human resource management*. Researchers World: Journal of Arts, Science & Commerce 3, 2012.

[10] Dryden, J. ICT, *The Economy And Society – Challenges Of Measurement And Analysis*, in: International Statistical Review. Presented at the Monitoring the Information Society: Data, Measurement and Methods, Geneva, 2003.

[11] Eurostat, 2011.National accounts - an overview, http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_-_an_overview (downloaded May 2. 2014)

[12] IDC Adriatics, *Analiza hrvatske ICT industrije 1999-2009*, http://www.hgk.hr/wp-content/files_mf/analizahrvatskeictindustrije199920092.pdf, (downloaded May 2. 2014.)

[13] Klaas, B.S., McClendon, J., Gainey, T.W. *Managing HR in the Small and Medium Enterprise*: The Impact of Professional Employer Organizations. Entrepreneurship Theory and Practice, 2000.

[14] Loncar, J. *Globalizacija kao nositelj suvremenih promjena u svijetu*. Geoadria 10., 2005.

[15] Micunovic,M. (2012), *Menadžment ljudskih resursa*, http://mateamicunovic.blogspot.com/2012/05/ljudski-resursi.html (downloaded April 03.2014.)

[16] MojPosao, MojPosao i Visoko učilište Algebra – analiza IT tržišta rada, http://www.moj-posao.net/Vijest/72696/MojPosao-i-Visoko-uciliste-Algebra-analiza-IT-trzista-rada/2/; downloaded April 03.2014.

[17] OECD, Eurostat. *Manual on the Measurement of Human Resources Devoted to S&T'CANBERRA MANUAL'*. OECD general distribution document, 1995.

[18] Panagiotakopoulos, A. *Employability skills development in Greek higher education institutions (HEIs): Implications for policy makers,* Higher Education, Skills and Work-based Learning 2(2), 2012.

[19] ProGEO Hrvatska , *Uvod u znanost*, http://www.progeo-croatia.hr/researchersnight/pdf/razno/Uvod%20u%20znanost.pdf, (downloaded April 03.2014.)

[20] Racunalo.com , *MojPosao i Visoko učilište Algebra analizirali IT tržišta rada, situacija i nije tako loša*, http://www.racunalo.com/mojposao-i-visoko-uciliste-algebra-analizirali-it-trzista-rada-situacije-i-nije-tako-losa/, (downloaded May 2. 2014.)

[21] Racunalni i ekonomski poslovi – REP d.o.o. za poslovne usluge . *Algebra: U Hrvatskoj najtraženiji Oracle i Java,* http://www.rep.hr/vijesti/zaposljavanje/algebra-u-hrvatskoj-najtrazeniji-oracle-i-java/5637, downloaded April 03.2014

[22] Teece, D. J., *Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance*. Strategic Management Journal, 28 (13), 2007.

[23] UNESCO (1997), *International Standard Classification of Education I S C E D*, http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm downloaded April 03.2014

[24] Vujic, V., *Menadžment ljudskog kapitala*, Rijeka: Sveučilište u Rijeci, Fakultet za turistički i hotelski menadžment, Opatija, 2005.

[25] Wolff, E., *Technology and the demand for skills*, STI Review,18, 1995

[26] World Economic Forum, *The Global Information Technology Report,* 2013. http://www3.weforum.org/docs/WEF_GITR_Report_2013.pdf , (downloaded April 03.2014.)

[27] Wright, P., M., McMahan, G., C., McWilliams, A. *Human Resources And Sustained Competitive Advantage: A Resource -Based Perspective*, 1993. http://ceo.usc.edu/pdf/T9319239.pdf, downloaded April 03.2014