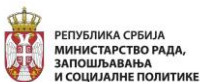




RESEARCH ON THE ROLE OF ICT – RELATED KNOWLEDGE AND WOMEN’S LABOR MARKET SITUATION

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1. INTRODUCTION

About the project “Research on the role of ICT-related knowledge and women’s labor market situation”

Study “Research on the role of ICT-related knowledge and women’s labor market situation” was created as a part of the project of the same name started by Ministry of labour, employment and social policy and within activities of National Action Plan (NAP) for implementation of National Strategy for Improving the Position of Women and Promotion of Gender Equality, which is supported by Swedish International Development Cooperation Agency (SIDA).

One of the reasons to start this project was the fact that according to latest statistical data men use computer and the Internet more often than women. Since these skills have become a prerequisite for employment on modern labour market and since they have growing influence on personal and private life, it was very important to research the situation in Serbia and recommend a set of measures aiming to improve the overall situation.

In this regard, within this Study we conducted detailed research and analysis of situation in Serbia, gave examples of best practices and made recommendations for all participants in this process.

Basic facts on ICT related knowledge and women’s labor market situation

Huge technological, economic and social changes during last three decades made an impact on almost all aspects of people’s life and work. Although it seemed that socioeconomic and technological development would lead to less discrimination of different social groups in the future, it still hasn’t happened. Women, who are the focus of the study, still have more difficulties in finding employment than men, they have lower income and are less represented in job categories that require technical education. Additionally, women use information and communication technologies (ICT) less often and have lower level of computer literacy¹. This is especially worrying because we entered the information age, which means sphere of work is inseparable from ICT use. Since the role of ICT-related knowledge in the context of position of women on the labour market is multidimensional phenomenon, it must be researched from various aspects, as it was done in this Study.

Examples from Europe and the world show that women employment rate in developed economies is decreasing, which is a sign of lack of motivation, promotion and measures supporting participation of women in all levels of work. For that reasons research conducted in this Study had two goals. First goal was to examine the situation in Serbia and compare it to the situation and examples of best practices in our region and in Europe, in order to better understand casual link between ICT knowledge and empowering women to improve their position on the labour market. Second goal was to better understand positive changes that could be initiated and sped up by recommended measures, which are part of set of recommendations arising from this project, because it would lead to better use of women’s potential and facilitate their inclusion to knowledge-based society and economy.

¹ In the scope of this research the term “Computer literacy” refers to the ability to use the computer, networking and Internet access.

Besides shedding the light on the role of ICT-related knowledge in the context of position of women in the labour market, we focused on main challenges related to equal participation of women in ICT sector, as well as on the opportunities this sector gives, considering that even during economic crisis it continued to grow and that it is recognized as a key sector for employment and economic development of a country on national and international level. Simultaneously, participation of women in these processes becomes an essential factor and gains importance. It is very important that economy of a country to be oriented towards strengthening of ICT sector and creation of new ICT jobs, since that will provide international competitiveness and long-term economic prosperity. Such orientation demands thoughtful planning from all actors involved in policy development, strategic decisions making, development and strengthening of mechanisms for equal representation of women, bearing in mind the fact that this sector is still predominantly “male”, and women’s potential is insufficiently used. These decisions become even more important if we consider the momentum new ICT technologies give to overall development of society, economy and labour market, and consequently to improvement of women’s position, both in business and private sphere of life, through acquiring and use of ICT skills.

Number of female computer and Internet users and their share in total number of persons using modern information and communication technologies, as well as the level of their computer literacy, are the key indicators of gender differences in ICT use in the context of the labour market. As for the situation in Serbia, only since 2013 number of ICT users in Serbia went over 50% according to the Statistical Office of the Republic of Serbia, which places Serbia among EU countries with lowest ICT penetration – Bulgaria and Romania². When it comes to composition of ICT users in Serbia, according to data from SORS, possession of a computer and internet use are significantly connected to socio-demographic factors, which is a characteristic of an early expansion phase of ICT usage³. In Serbia computers and internet are primarily used by young persons, urban population, persons with higher level of education and with higher income. In comparison with rural households, urban households more often possess a computer and there is even more significant difference in relation to internet connection. This is particularly because rural infrastructure and financial status of rural households are worse, and financial status proves to be one of the key determinants of computer and internet use in Serbia.

As for gender differences in computer use in Serbia, statistical data shows that every year there is more men than women that use computer and the Internet. Men also have higher level of computer literacy than women, both in Serbia as a whole and in its regions. Observed differences aren’t large, but they are stable, which indicates that there are certain structural reasons behind men having higher computer literacy in comparison to women.

Structure of the Study

Study has ten chapters and three annexes. In the end of the document there is a list of used abbreviations. Recommendations presented in separate chapter form a base for further activities of decision makers and they show different aspects of state of gender equality in Serbian labour market in comparison to region and global trends.

² International Telecommunications Union (ITU), 2013

³ Chen, W., Boase, J. and Wellman, B. (2002), *The Global Villagers: Comparing Internet Users and Users around the World*, in Wellman, B. and Haythornthwaite, C., *The Internet and Everyday Life*, Blackwell, Oxford

Chapter 1, **Introduction**, contains basic ideas and objectives for research on role of ICT knowledge in the context of position of women in the labour market, as well as the structure of the whole Study.

Chapter 2, **Research methodology**, contains review of research methodology and indicators used to examine all relevant aspects of the problem of insufficient representation of women in the field of ICT use in business environment. After detailed analysis, an issue of ICT knowledge in the context of women in the labour market is operationalized through two groups of quantitative and two groups of qualitative indicators, four groups of indicators in total, which are used for analysis and presentation of data collected from all fields covered by the study.

Chapter 3, **Comparison of the situation in Serbia with the EU and the region**, contains comparison of indicators used to examine impact of ICT on women in the labour market in Republic of Serbia with two EU countries and two countries from our region. After reviewing progress and gender trends, we selected the following countries as an example: Poland and Finland, as EU countries, and Croatia and Slovenia, as countries from the region. We compared statistical data from Eurostat and OECD databases, for EU countries, and data from Statistical offices of Republic of Serbia, for data on Serbia. We conducted detailed statistical analysis on data grouped and presented through 4 relevant fields: Employment, Education, Obtaining ICT knowledge and ICT companies.

Chapter 4, **Review of national and international initiatives and examples of best practices**, contains analyses and review of national and international initiatives (formal and informal projects, networks and campaigns). Period reviewed during this research was the last decade. We listed all significant initiatives and projects about impact of ICT on women's labour market which were realized in Serbia, Finland, Poland, Slovenia and Croatia during last decade. Through these initiatives we presented measures that certain countries took with an aim to improve position of women in ICT labour market.

Chapter 5, **Review of regulatory and strategic approaches in Serbia and networking best practices examples**, contains review and analyses of existing strategies, regulatory documents, initiatives and activities implemented in the most important world institutions, as well as of networks engaged in continuous promotion of women's role in ICT sector. We didn't conduct qualitative analysis of documents during our review, but we tried to point out omissions related to gender equality principle that occur during adoption of strategic documents. We also listed examples of best practices, primarily from Serbia, but from other European countries as well.

Chapter 6, **Labour market and ICT knowledge**, was created as a result of comprehensive analysis of current situation in the labour market and trends concerning development of certain knowledge and skills. Basic objective was to identify future movements in Serbian labour market by analyzing global trends. Additionally, objective was to use the research to present current situation in the labour market, with an emphasis on participation of women in ICT sector.

Chapter 7, **Analysis of women and men who graduated from engineering**, sheds the light on the problem of insufficient representation of women in the fields of science and engineering, both in education and in practice. We presented data that illustrate unequal representation of women in working conditions and inequality in retaining of positions on all levels, especially highest corporative and academic positions. We discussed about small number of women in technical professions and reasons behind girls having lower interest in technical sciences, for example: challenges and obstacles women face in male dominated work environment, children care and upbringing, different expectations from men and women based on country culture, as well as stereotypes on skills, abilities and competencies of

both gender which are deep-rooted in academic and corporative world. We present statistical data and analysis of representation of women in total number of engineering graduates in Serbian universities. Analyzed data came from two sources: official documents of Ministry of Education, Science and Technological Development of the Republic of Serbia and Statistical Office of the Republic of Serbia. We also used data from a number of Offices for Student Affairs of analyzed technical universities. We presented the most significant results, which could be use as a starting point for further research or case studies.

Chapter 8, **Results of field research**, contains presentation of analyzed field research results on gender differences in ICT use in the context of the labour market. Detailed and systematic analysis of gender differences was conducted using existing statistical data and data collected from field research on a sample of 400 respondents.

In Chapter 9, **Analysis of ICT impact on the quality of life**, we examine implementation of various aspects of ICT use through four basic perspectives: technisistic, legislative, instrumentally-utilitarian and socio-psychological, with an emphasis on aspects that have significant impact on spreading of ICT use and aren't clearly visible. This analysis is based on the fact that there are social factors which aren't sufficiently recognized and emphasized, but could be decisive for spreading of ICT use especially in categories of population that lag behind. It focuses on different social aspects of women ICT (non)use as a factor that improves or worsens quality of their lives.

Chapter 10, **Final conclusions and Recommendations**, in the Study we proposed a set of recommendations that cover all discussed matters and which are based on conclusions and recommendations made within thematic chapters. These recommendations are also supposed to be used as guidelines by state institutions, local institutions, National Employment service, educational institutions and companies in order to achieve more efficient and equal participation of women in ICT sector, and to provide for easier and faster inclusion of women in information society.

In **References**, we list all sources used in preparation of the Study. For easier orientation, some chapters contain references to sources used in particular part of research study.

Annex 1, **Questionnaire**, contains questionnaire used for collection of data on gender differences in ICT use in the context of the labour market, as a part of field research. Research was conducted in eight cities and villages in Serbia and included 400 persons. The detailed and systematic analysis of collected data was couducted, using existing statistical indicators, in order to get valid statistical data on gender differences.

Annex 2, **Interview guide**, contains questionnaire used for in-depth interviewing of 10 women from different groups of female users and non-users of ICT. Guide covers the following indicators: 1. Factors which encourage/discourage use of computer and the Internet, 2. Business use of computer and the Internet, 3. Education through ICT, 4. Benefits of ICT use in everyday life, 5. Difficulties and problem in use of ICT. These indicators were obtained by in-depth interviews with ten women who represented different groups of female ICT (non)users.

Annex 3, **General information on sureveyed countries**, contains general, demographic data for each country analyzed in Chapter 4. In order to have better view of starting situation in selected countries we first presented general, demographic data for each of surveyed countries, and after that data on women in the labour market, women with part-time jobs, college and university students and female researchers.

In Appendix 4, **Best practice examples of ICT knowledge impact on women labor market**, represented by Motorola Poland as an example of good practice in education, and Telia Sonera Finland as an example of good practice in career development. Also the study of women in the ICT sector around the world: India, Korea, the Philippines, Russia, Argentina, Canada, America, France and Germany is shown.

List of **Abbreviations** used in the text can be found at the end of the Study.

2. RESEARCH METHODOLOGY

In defining research methodology it was important to define indicators through which all the relevant aspects related to the problem of under-representation of women connected to ICT use in the field of work will be observed. After detailed analysis we operationalised the question of the role of ICT-related knowledge and the women's Labour Market situation through two groups of quantitative and qualitative indicators, both further divided in two sub-groups, resulting with four sets of indicators (Table 2.1).

The first set of indicators was related to the issue of access to and the use of ICT in Serbia, especially in the context of female users. Research shows that in Serbia just over half of the population uses the internet and that men ICT users make up the majority comparing to women⁴. Women older than 50 years of age, those who live in rural areas and those with lower incomes than average are particularly disadvantaged. It is clear that without the possibility of access to these technologies there is no benefit of its usage. However, the accessibility is necessary but not a sufficient condition for the successful use of ICT. The Census held in Serbia in 2011 has shown that women have lower levels of ICT literacy than men, which means that their capacity to use these technologies is weaker in comparison to men. In the context of our study, it was important to investigate the ability of women's use of ICT and the level of their ICT literacy. Within this group these indicators were determined: 1. *ICT access*, 2. *ICT literacy*, 3. *ICT use*, 4. *social resources on the Internet* and 5. *ICT values orientation*. These indicators were obtained through field research survey which included all regions in Serbia (See questionnaire in Appendix 1).

The second group of indicators was linked to the status of men and women in the labour market, especially within the IT sector, as well as the distribution of men and women with engineering diplomas. The data on employment of women in Serbia shows a low activity rate of women in the labor market. The rate of women in the total population of working age (15-64) is about 40% in 2006, while in the same year the employment rate of men is about 60%⁵. On the other hand, the issue of women's underrepresentation in sciences and engineering fields, whether its elementary school, higher education, or industry, has been active in many ways over the last several decades. Disparity between women and men has persisted in the requirement and retention of women on all levels, particularly in the highest corporate and academic positions. The engineering jobs are still considered as traditionally male dominated profession and are employers prefer male employees. Women face different challenges and obstacles in this "male" field. Within this group these indicators were determined: 1. Labour market and ICT, 2. Engineers ratio by gender, 3. The participation of women in the IT sector, 4. Comparison of Serbia with other European countries. These indicators are obtained through the analysis of statistical data provided by the Statistical office of the Republic of Serbia, The National Employment Service, and through contacts with Universities.

The third group of indicators relates to the use of ICT in the context of the quality of life. Only when people have the opportunity to use ICT and know how to use it we can analyse the purpose of this usage, and its direct benefits to the quality of life. As the concept of the quality of life is a

⁴ Statistical Office of the Republic of Serbia (SORS), 2013.

⁵ SORS, 2008.

multidimensional phenomenon, its analysis can be approached from different angles⁶. For the purposes of this study the concept of the quality of life is defined as the use of ICT in order to fulfil the individual needs and desires ranging from family life to business needs. Within this group of indicators, special attention is given to the question of difficulties and problems in the ICT usage, especially on the issue of discrimination against women in the process of training and implementation of ICT. Accordingly, the indicators are defined as follows: 1. Factors for and against ICT use, 2. The benefits of using ICT for business, 3. Education through ICT, 4. Everyday life and ICT usage, 5. Difficulties and problems related to the ICT usage. These indicators are obtained through in-depth interviews with ten women who represented different groups of ICT users and non-users (See interview guidelines in appendix 2).

The fourth group of indicators refer to the review and analysis of existing documents, such as legislation acts, initiatives and strategies in order to determine if and how they take into account the issue of gender equality in the context of ICT usage. It is not unusual that participation of women in certain spheres of social, economic and political life is prescribed by specific regulatory acts. These facts are very important because they indicate the extent to which the governmental institutions take into account particular issues and whether they are prioritized or not. In addition to the governmental institutions the non-governmental sector can also have an important role which is why we put an emphasis on the existence and operation of non-governmental organizations and networks involved in the promotion of ICT use by women. The examples of best practices from in some European countries are also explored. Within this group the following indicators are defined: 1. ICT and regulation acts, 2. Strategies and initiatives for equal use of ICT, 3. Organizations engaged in the promotion of ICT for women, 4. ICT trainings, programs, education for women. These indicators are acquired through the analysis of existing laws, strategies, initiatives, non-governmental organizations and networks that exist and operate in Serbia.

It should be noted that the study of these indicators serve as a basis for the findings in the individual sections of this Study.

⁶ Blažun, H. (2013) Elderly People's Quality of Life with Information and Communication Technology (ICT): Toward a Model of Adaptation to ICT in Old Age, University of Eastern Finland Faculty of Social Sciences and Business Studies

Table 2.1. Set of indicators

Quantitative				Qualitative			
1. Research on ICT use in Serbia		2. Existing statistical data on education and labour market		3. ICT and quality of lifej		4. Serbian documents analysis	
1.1	ICT Access	2.1	Labour market and ICT	3.1	The factor for and against the use of ICT	4.1	ICT and regulation acts
1.2	ICT literacy	2.2	Engineers ratio by gender	3.2	The benefits of using ICT for business	4.2	ICT for women strategies and initiatives
1.3	ICT use	2.3	The participation of women in the IT sector	3.3	Education through ICT	4.3	Organizations engaged in the promotion of ICT for women
1.4	Social capital on the internet	2.4	Serbia and EU countries	3.4	Benefits of ICT use in everyday life	4.4	ICT trainings, programs, education for women
1.5	ICT value orientations			3.5	Difficulties and problems related to the ICT use		

Annex 1 contains the **Questionnaire**, which was used for collecting data on gender differences in ICT use in the context of the labor market as a part of field research conducted in eight cities and villages across Serbia. The study included over 400 respondents, . Detailed and systematic analysis of collected data was conducted, using existing statistical indicators, in order to produce valid statistical data on gender differences.

Appendix 2 conatins **interview guidelines** that were used for in-depth interviews with ten female ICT users and non-users. Based on that the following indicators were defined: 1. Factors that encourage/inhibit use of computer and the Internet, 2. Business use of computer and Internet, 3. Education through ICT, 4. Benefits of ICT use in everyday life, 5. Difficulties and problems in use of ICT.

3. COMPARISON OF THE SITUATION IN SERBIA WITH THE EU AND THE REGION

This chapter shows the comparison of indicators which presents the influence of ICT on women in the labor market between Serbia and two countries from EU and two countries from the region. After analysis of progress and gender trends following countries are chosen as exemplary: Poland and Finland, as two EU members, and Croatia and Slovenia, as countries from the region, but also EU members. As already stated in the introductory part of this Study, the reasons for these country selection are diverse. Poland is the country which passed through an intensive period of rising gender awareness in the past decade, as well as computerization of society and the economy. Certain success is achieved in that field, although Poland is considered to be one of the traditional, extreme catholic countries. These characteristics were the reason to select Poland for comparison, since the dominant patriarchal social environment is a common feature for Serbia and Poland. On the other hand, Finland is the country with a very long tradition of gender equality. In this country, women have participated in all levels of decision making in the business sector, as well as in political. Finland has been chosen for this detailed analysis and comparison because it is one of the most developed countries of Europe when it comes to gender issues and best practices example. Croatia and Slovenia are countries that had to meet certain gender equality standards in order to join the EU, and since they had the same political and social development as Serbia until 1990s, it was a logical choice to compare them with Serbia. The fact that these countries are a part of EU made Eurostat database search easier, as well as further adequate comparison.

Statistical comparisons were based on statistical data obtained mostly from Eurostat and OECD for EU countries, and Statistical Office of the Republic of Serbia for data associated with Serbia.

Appendix 3 shows the general demographic data for each country. We presented data on women in the labor market, women with part-time jobs, university, college and high school students and women researchers for each country used for comparison.

In this chapter, data used for detailed statistical analysis was grouped in the following areas:

- Employment
- Education
- Obtaining ICT skills
- ICT enterprises.

The analyzed areas are shown in percentages, graphics and tables, so that:

- The first group consists of indicators related to the field of Employment: employment by sex, unemployment by sex, enterprises that use computers, employees that use computers, enterprises with internet access, women and men in selected occupations, and finally, women and men in public life.
- The second group consists of indicators of Education: number of women and men with higher education, the percentage of those who have never used the computer, the percentage of women and men with low, medium and higher education that have never used ICT.
- The third group consists of data relevant for Obtaining ICT-related knowledge: computer usage by sex and age, the percentage of those who have obtained ICT-related knowledge through formal

educational institutions by level of education, and finally, individuals who have obtained ICT-related knowledge through self-study.

- The fourth group is related to ICT enterprises: enterprises that employ ICT specialists, the percentage of individuals who used computers on the work, the percentage of enterprises received orders via computer network, enterprises selling online

Further, the chapter emphasizes the lack of particular data for Serbia and where additional effort should be directed in order to make Serbia closer to EU gender equality standards. These findings were used to create an appropriate set of recommendations from Chapter 10.

3.1. Employment

3.1.1. Employment by sex and age: 15-64 age

Analysis of data about employment shows that Finland has the highest percentage of employees, then Slovenia, Poland, Croatia and at the end Serbia. However, all the countries have higher percentage of male employees than female. Unfortunately, since 2008 the employment rate has a negative trend in Serbia. The following Table 3.1 shows total percentage of employees, as well as the percentage of men and women in total number of employees with graphical illustration on Figure 3.1.

Table 3.1 Total percentage of employees in selected countries

	2006			2007			2008			2009			2010		
	F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
Croatia	49,4	62	55,6	50	64,4	57,1	50,7	65	57,8	51	62,4	56,6	48,8	59,4	54
Poland	48,2	60,9	54,5	50,6	63,6	57	52,4	66,3	59,2	52,8	66,1	59,3	53	65,6	59,3
Finland	67,3	71,4	69,3	68,5	72,1	70,3	69	73,1	71,1	67,9	69,5	68,7	66,9	69,4	68,1
Slovenia	61,8	71,1	66,6	62,6	72,7	67,8	64,2	72,7	68,6	63,8	71	67,5	62,6	69,6	66,2
Serbia	32	49,3	40,4	33,8	50,3	41,8	36,5	53,2	44,4	34	49,1	41,2	31,1	45,3	37,9

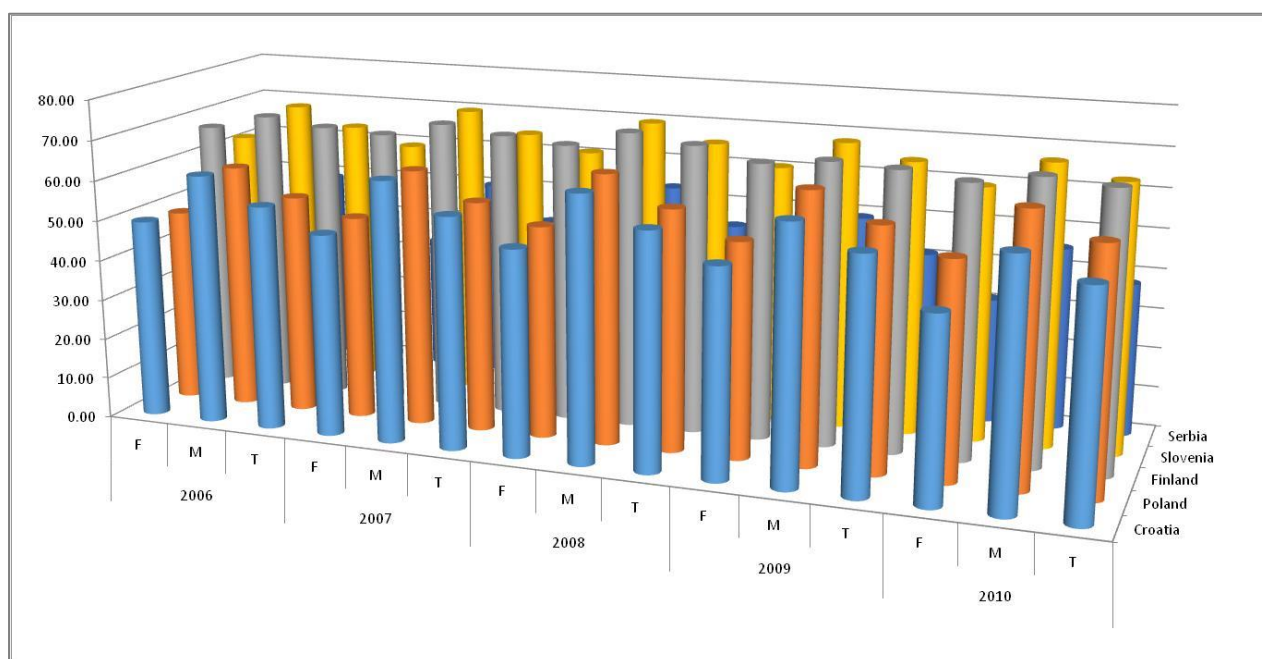


Figure 3.1 Employment by sex

3.1.2. Unemployment by sex and age

Unemployment rate in considered countries shows a slight increase in the period from 2008 to 2012. Unfortunately, the Republic of Serbia has the worst position in comparison with other countries according to this indicator. Analyzing data from Croatia, it can be noticed that women were more unemployed than men in 2008, but this difference decreased over time, indicating that this problem has been considered, Table 3.2 and Figure 3.2. Difference in unemployment rate by sex has been decreased in 2011 in Serbia, but due to lack of relevant data for the next period, we cannot conclude whether this good example is continued.

Table 3.2 Unemployment rate

	2008		2009		2010		2011		2012	
	M	F	M	F	M	F	M	F	M	F
Croatia	7,0	10,1	8,0	10,3	11,4	12,3	13,8	13,2	16,2	15,6
Poland	6,4	7,9	7,8	8,6	9,4	10,0	9,0	10,4	9,4	10,9
Finland	6,1	6,7	8,9	7,6	9,1	7,6	8,4	7,1	8,3	7,1
Slovenia	4,0	4,8	5,9	5,8	7,5	7,1	8,2	8,2	8,4	9,4
Serbia	11,9	15,8	14,8	17,8	18,4	20,2	22,4	23,7	:	:

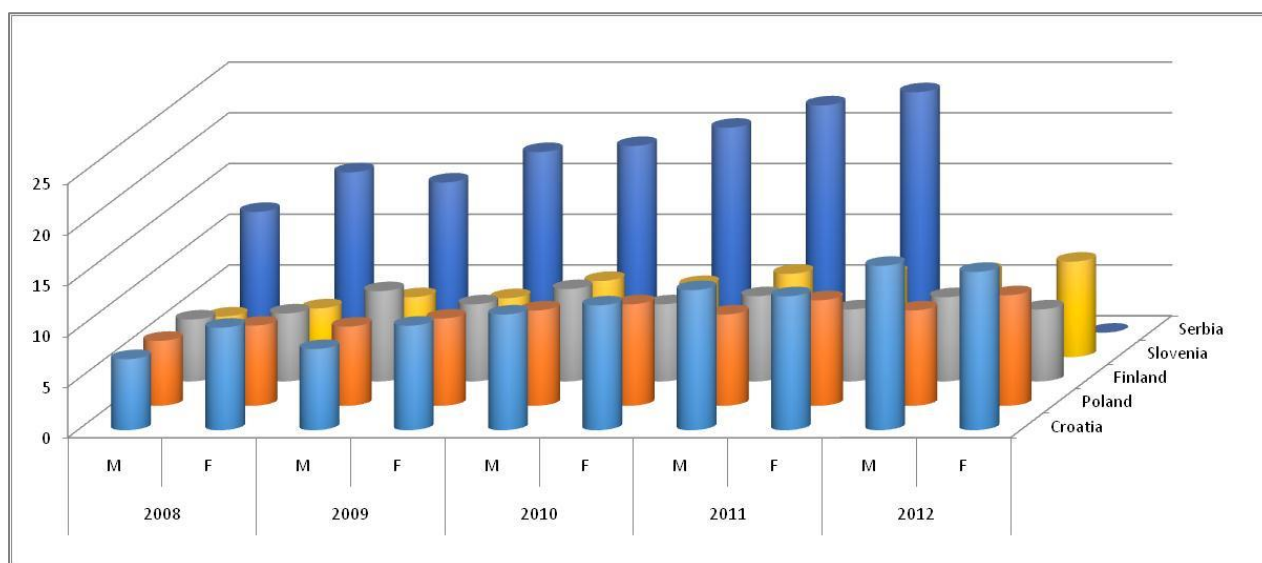


Figure 3.2 Unemployment by sex

3.1.3. Enterprises that use computers

Table 3.3 and Figure 3.3 show the percentage of enterprises that use computers in selected countries in reviewed period. It is easy to notice the dominance of Finland in the field of ICT usage in enterprises. The main conclusion of this comparison slight advantage of Serbia in relation to Poland, Slovenia and Croatia, for the period after 2010. Relevant data from Serbia have a positive trend.

Table 3.3 Percentage of enterprises that use computers

	2008	2009	2010	2011	2012
Croatia	99	99	97	97	97
Poland	95	94	97	96	95
Finland	100	100	100	100	100
Slovenia	97	97	98	98	98
Serbia	98	98	98	98	99

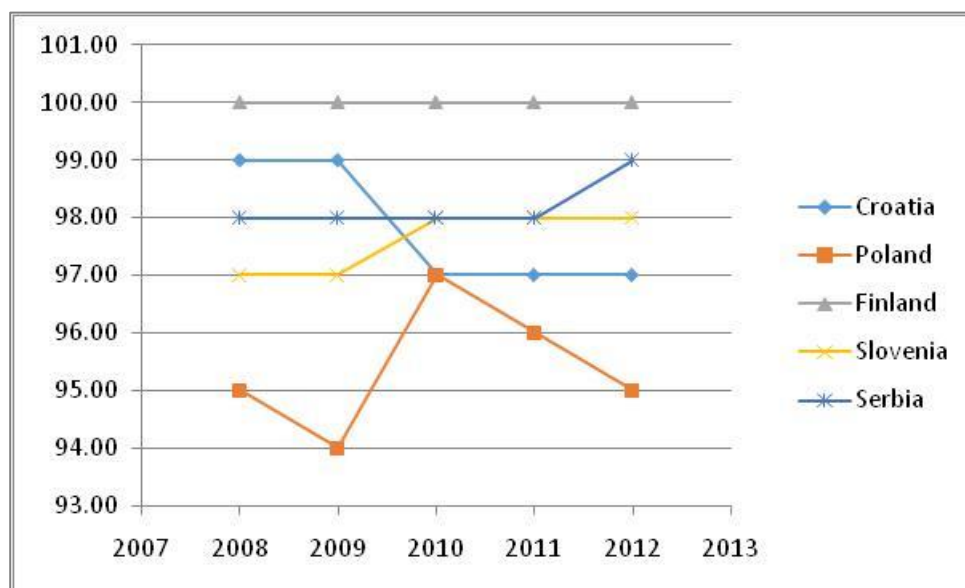


Figure 3.3 Percentage of enterprises that use computers

3.1.4. Employees that use computers

The percentage of employees that use computers is an indicator that is not available for Serbia. Finland is far ahead from other three countries, but all countries show growth of this indicator. Croatia and Poland are in the last position, but with strong positive trend. Table 3.4 and Figure 3.4 present the percentage of employees that use computers.

Table 3.4 Percentage of employees that use computers in surveyed countries

	2008	2009	2010	2011	2012
Croatia	45	45	44	45	46
Poland	37	40	40	42	43
Finland	73	74	71	72	72
Slovenia	49	55	52	54	56

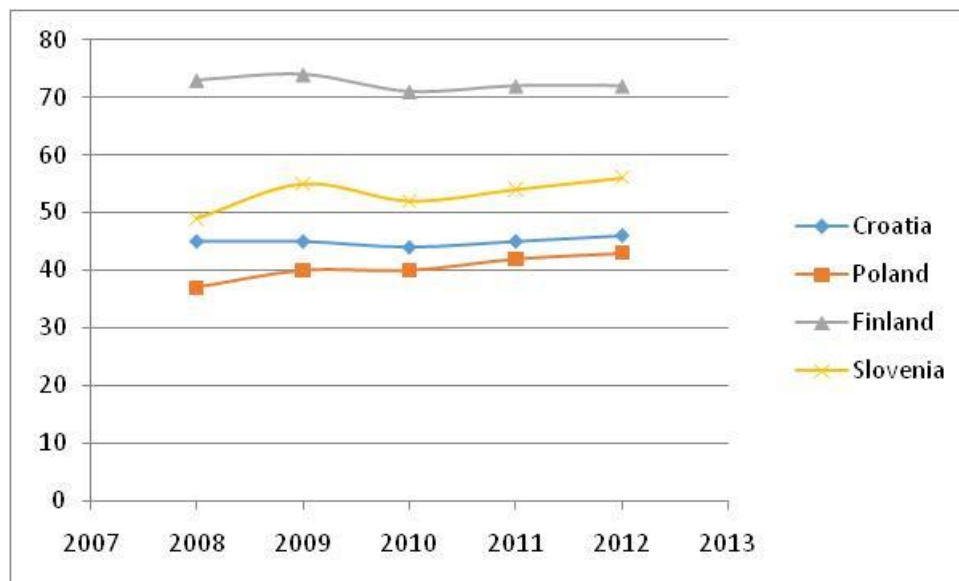


Figure 3.4 Percentage of employees that use computers in surveyed countries

3.1.5. Enterprises with Internet access

The data presented in Table 3.5 and Figure 3.5 shows the percentage of companies with Internet access in surveyed countries, as well as the trend of this indicator from 2008 to 2012. Finland is the first in this comparative analysis, with Serbia and Slovenia on the second position since 2010. Data from Serbia has a positive trend.

Table 3.5 Percentage of companies with Internet access in the surveyed countries

	2008	2009	2010	2011	2012
Hrvatska	98	96	95	96	96
Poljska	93	91	96	94	93
Finska	100	100	100	100	100
Slovenija	99	98	97	97	98
Srbija	92	95	97	97	98

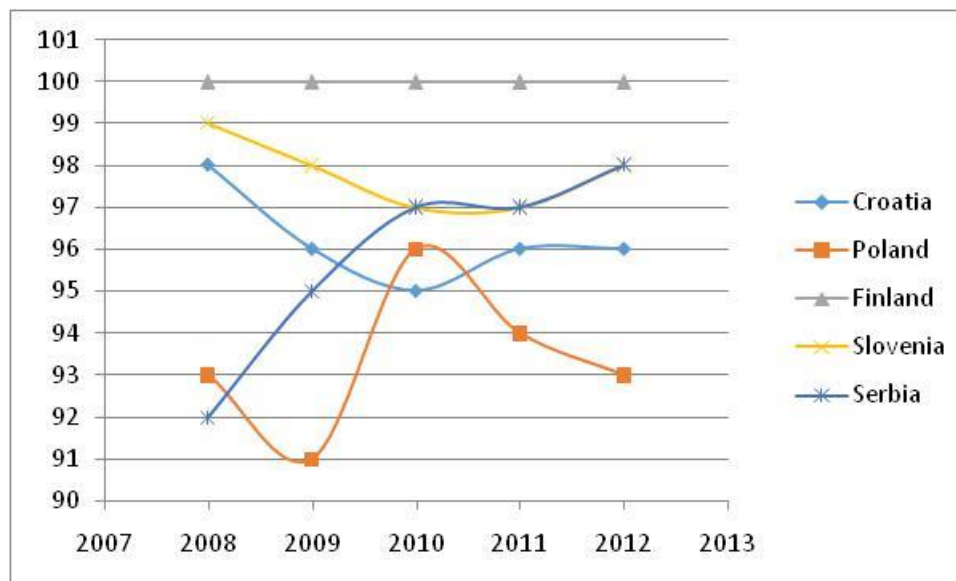


Figure 3.5 Grafic representation of the percentage of companies with Internet access in the surveyed countries

3.1.6. Women and men in selected occupations

By analyzing collected data it can be concluded that men are the majority as legislators, as well as craftsmen and employees in factories. On the other hand, more women than men are employed as clerks, but there is slightly larger number of women than men employed as experts. It is interesting to note that in all surveyed countries the same sex is always dominant for each occupation.

Table3.6 Percentage of employees by sex and job position

	Legislators		Professionals		Clerks		Craft		Plant and machine		
	M	F	M	F	M	F	M	F	M	F	
Croatia	75	25	39	61	32	68	92	8	74	26	
Poland	62	38	37	63	36	64	88	12	86	14	
Finland	68	32	52	48	23	77	92	8	84	16	
Slovenia	62	38	39	61	41	59	90	10	73	27	
Serbia	67	33	42	58	44	56	85	15	90	10	

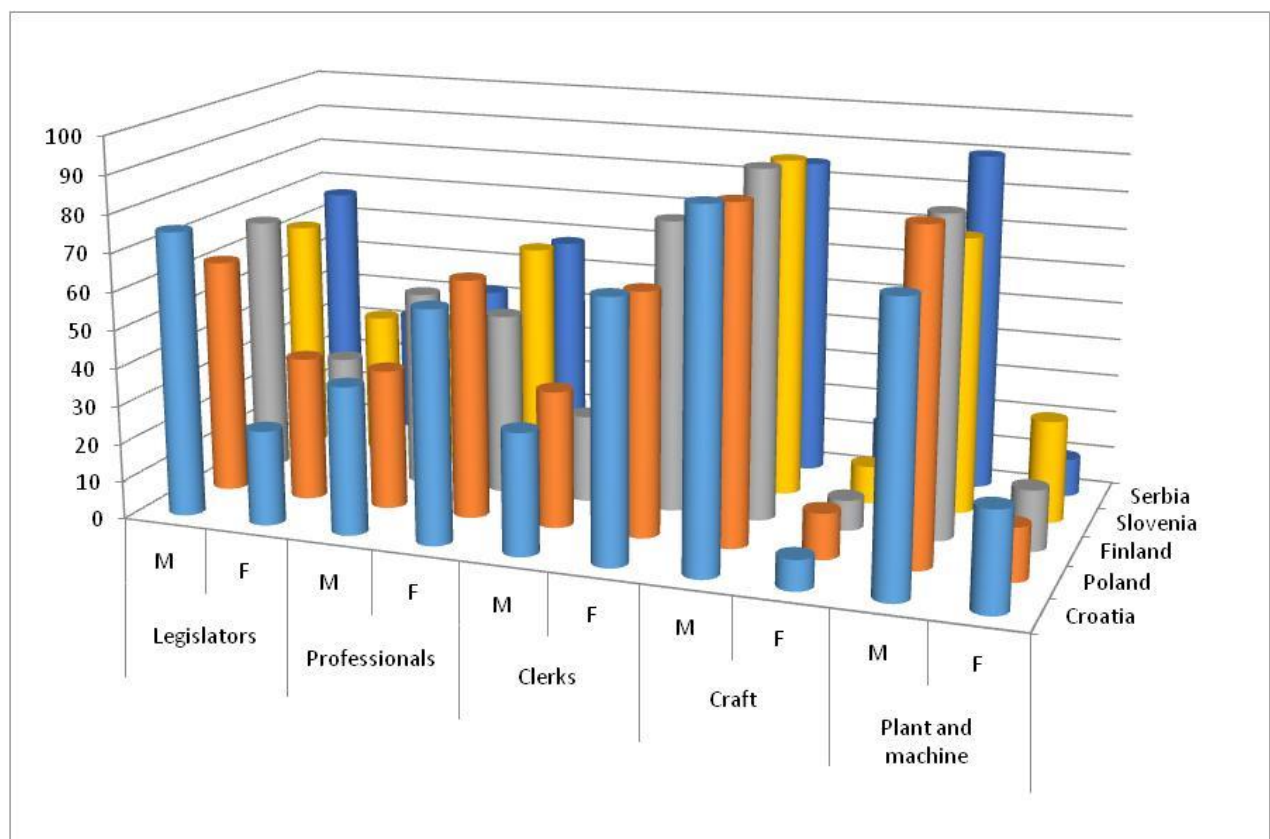


Figure 3.6 Representation of the structure by sex at certain position

3.1.7. Women and men in public life

The ratio of men and women in public life is reflected through gender equality in government and in the judicial system of each country. Ministers are mostly men, in a large percentage. The exception is Finland, where women in the government are represented by 47%. Members of parliament were again predominantly male, with exception of Finland that has almost equal participation of both sexes. Finally, all countries except Finland, where gender balance has been established, have more women than men judges, Table 3.7 and Figure 3.7.

Table 3.7 Structure by sex in public positions

	Government ministers		Members of parliament		Judges	
	M	F	M	F	M	F
Croatia	80	20	76	24	33	67
Poland	79	21	80	20	36	64
Finland	53	47	57	43	55	45
Slovenia	93	7	86	14	23	77
Serbia	82	18	78	22	29	71

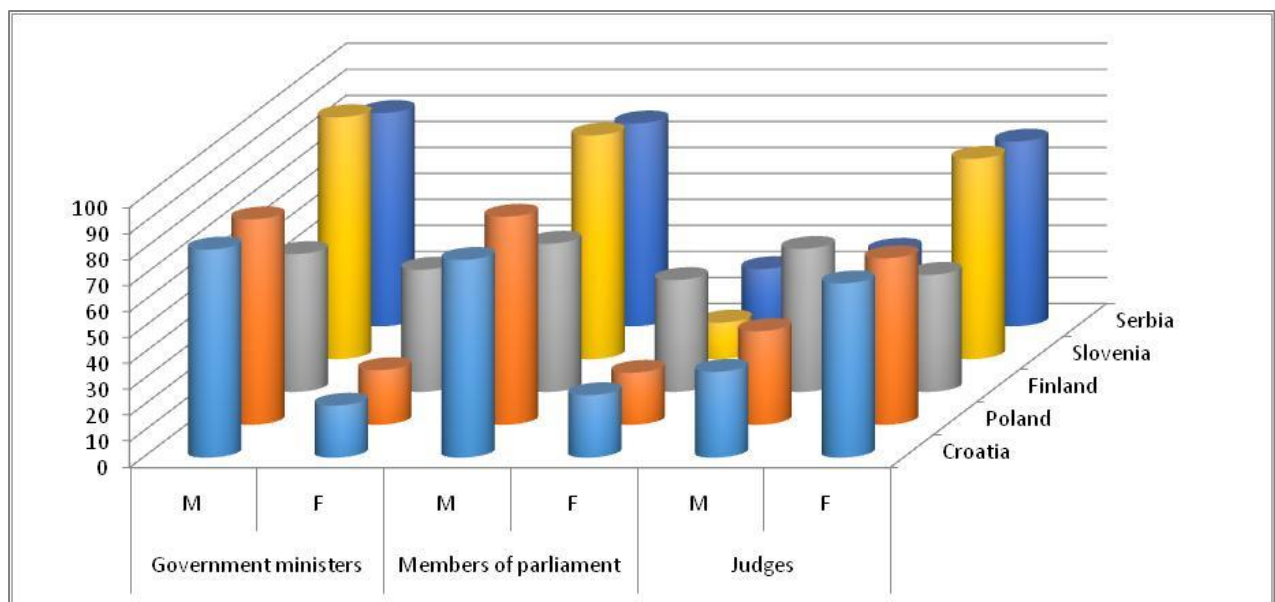


Figure 3.7 Structure by sex in public positions

3.2. Education

3.2.1. Number of women and men with higher education

The collected data show that there are more women than men with higher education in all considered countries. Unfortunately, slight decrease in the number of men and women with higher education is apparent in Serbia, while, for example, in Croatia and Slovenia, we can conclude that this number is constant in four-year relevant period. The data is shown in Table 3.8 and Figure 3.8.

Table 3.8 Percentage of women and men with higher education

	2008		2009		2010		2011	
	M	F	M	F	M	F	M	F
Croatia	45.40	54.60	44.98	55.02	43.69	56.31	42.68	57.32
Poland	42.42	57.58	42.11	57.89	40.82	59.18	40.13	59.87
Slovenia	45.78	54.22	45.99	54.01	46.17	53.83	46.01	53.99
Finland	41.86	58.14	42.04	57.96	42.16	57.84	39.37	60.63
Serbia	44.61	55.39	44.76	55.24	44.68	55.32	44.36	55.64

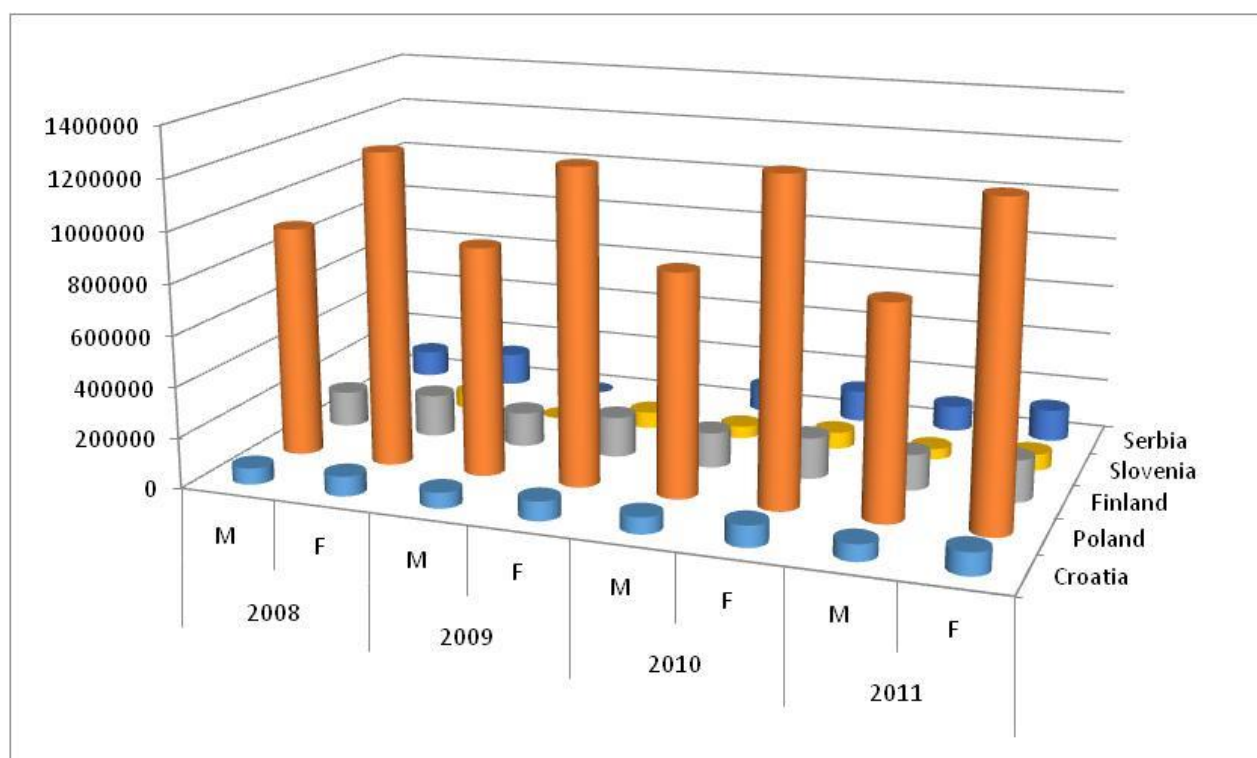


Figure 3.8 Grafic representation of number of women and men with higher education

3.2.2. The percentage of those who have never used a computer

The largest number of those who have never used a computer is in Serbia. Croatia is in the second place, followed by Poland, Slovenia and Finland at the end. It is encouraging that this ratio decreases, i.e. an increasing number of people around the world acquire ICT skills, as it is shown in Table 3.9 and Figure 3.9.

Table 3.9 The percentage of those who have never used a computer

	2009	2010	2011	2012
Croatia	43	38	36	30
Poland	34	32	30	31
Finland	11	8	7	5
Slovenia	33	28	29	28
Serbia	45	44	40	39

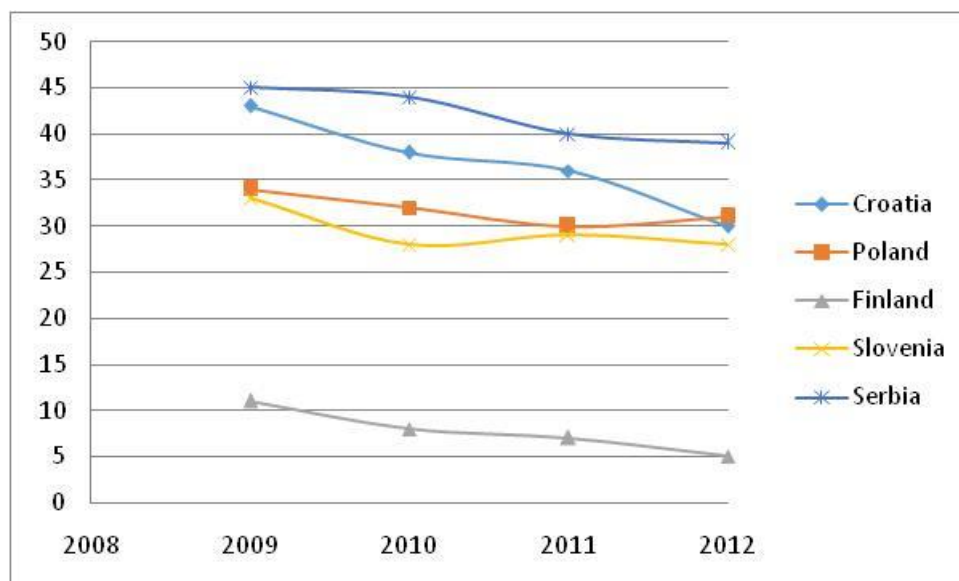


Figure 3.9 The percentage of those who have never used a computer

3.2.3. The percentage of women and men with low education who have never used ICT

This indicator is not available for Serbia. When analyzing the available data, it can be concluded that there are more women with low education who have never used ICT than men. Finland is again in the first position with the smallest number of men and women with low education who have never used ICT. Poland is in the second place, while Croatia and Slovenia are about the same. These relations are shown in Table 3.10 and Figure 3.10.

Table 3.10 Percentage of women and men with low education who have never used ICT

	2011		2012	
	M	F	M	F
Croatia	73	79	63	79
Poland	54	66	57	68
Finland	26	35	26	30
Slovenia	60	80	64	82

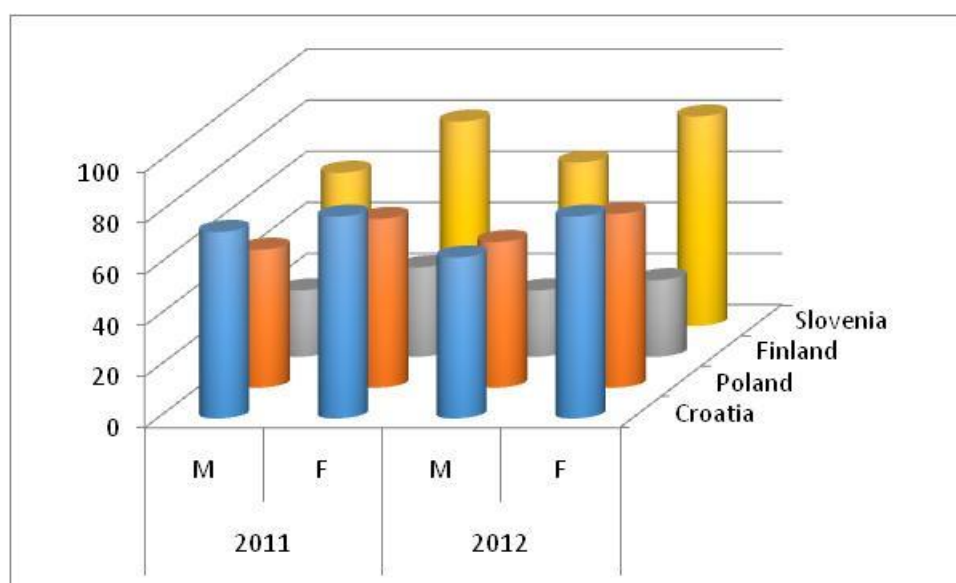


Figure 3.10 Percentage of women and men with low education who have never used ICT

3.2.4. The percentage of women and men with secondary education who have never used ICT

This data is not available for Serbia. Ranking of the considered countries is as follows: Poland is in the last position, then Slovenia and Croatia, followed by Finland, as the country with the lowest number of men and women with secondary education who have never used a computer. However, the situation is the same as for the previous indicator, the number of women with secondary education who have never used a computer is higher than number of men, Table 3.11 and Figure 3.11.

Table 3.11 Percentage of women and men with secondary education who have never used ICT

	2011		2012	
	M	F	M	F
Croatia	26	32	28	32
Poland	47	54	48	52
Finland	14	16	12	14
Slovenia	31	29	28	33

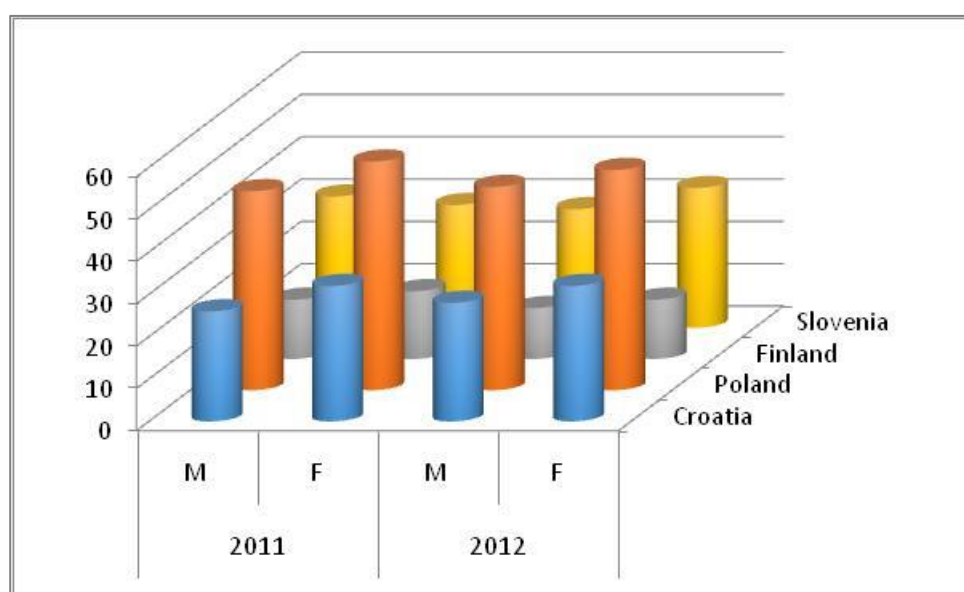


Figure 3.11 Percentage of women and men with secondary education who have never used ICT

3.2.5. The percentage of women and men with higher education who have never used ICT

This information is not available for Serbia and Slovenia. Poland and Finland have similar numbers of men and women with higher education who have never used ICT, and Finland certainly has the best position observing this indicator. As with the previous two indicators, here is, again, more women with higher education who have never used ICT than men. Table 3.12 and Figure 3.12 show these data.

Table 3.12 Percentage of women and men with higher education who have never used ICT

	2011		2012	
	M	F	M	F
Croatia	11	12	9	12
Poland	8	13	8	11
Finland	5	5	:	3

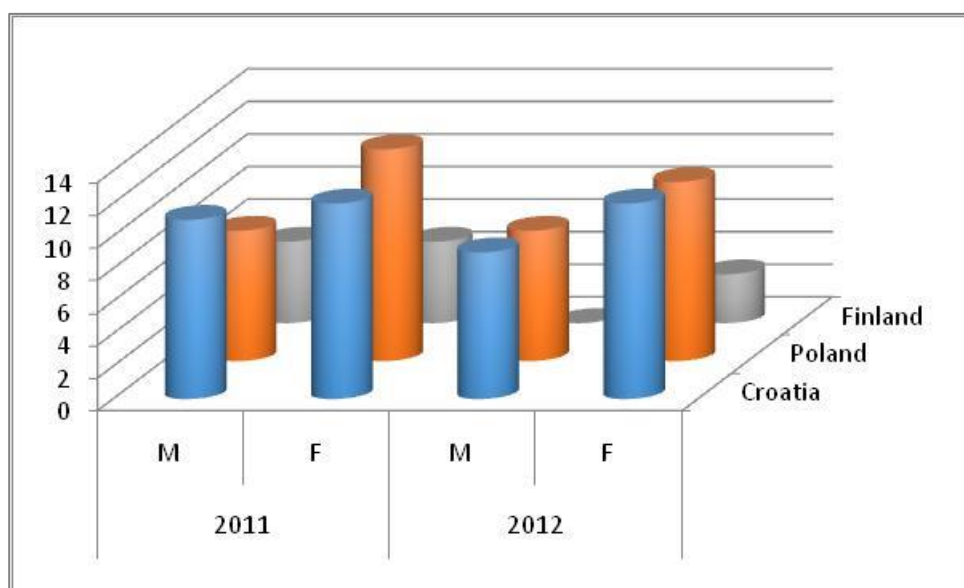


Figure 3.12 Percentage of women and men with higher education who have never used ICT

3.3. Obtaining ICT skills

3.3.1. Computer usage by sex and age

General conclusion is that there is no gender difference in this field. Some differences are observed in the group of respondents of 55-74 years, whereby the situation in Serbia is similar to situation in Slovenia and Poland, as seen in Table 3.13 and Figure 3.13.

Table 3.13 Percentage of women and men which use computer by age

	16-24		25-54		55-74	
	M	F	M	F	M	F
Croatia	90	90	72	72	20	10
Poland	98	98	70	75	30	22
Finland	100	100	98	99	70	66
Slovenia	100	100	81	80	40	22
Serbia	93	88	64	64	21	19

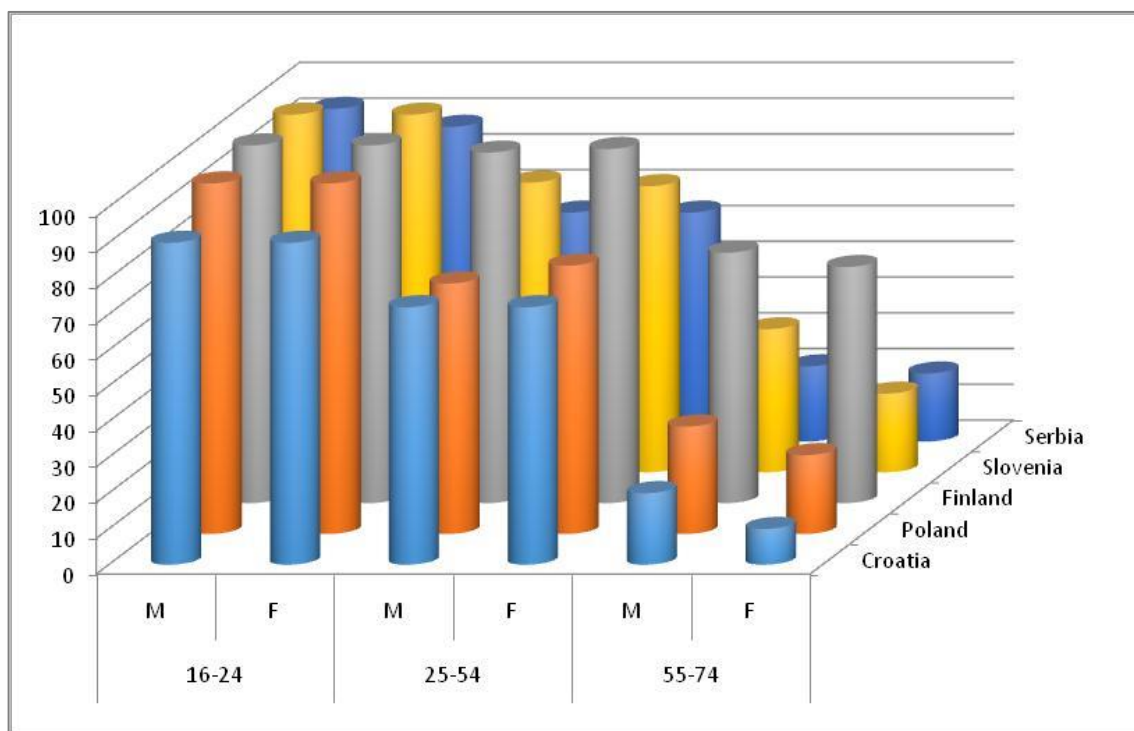


Figure 3.13 Computer usage by age

3.3.2. Individuals who have obtained ICT related knowledge through formal educational institutions (school, college, university, etc.)

Unfortunately, Serbia has no data for this indicator, but it can be concluded that indicator's value of the other countries is similar, and there are very small gender-related differences, Table 3.14. The graphical presentation of this indicator is given in Figure 3.14.

Table 3.14 Percentage of women and men who obtained IT skills through formal educational institutions

	2005		2006		2007		2011	
	M	F	M	F	M	F	M	F
Croatia	:	:	:	:	13	13	24	18
Poland	24	23	25	23	25	24	31	28
Finland	26	33	21	29	23	30	36	41
Slovenia	21	28	26	28	27	29	31	31
Serbia	:	:	:	:	17	17	:	:

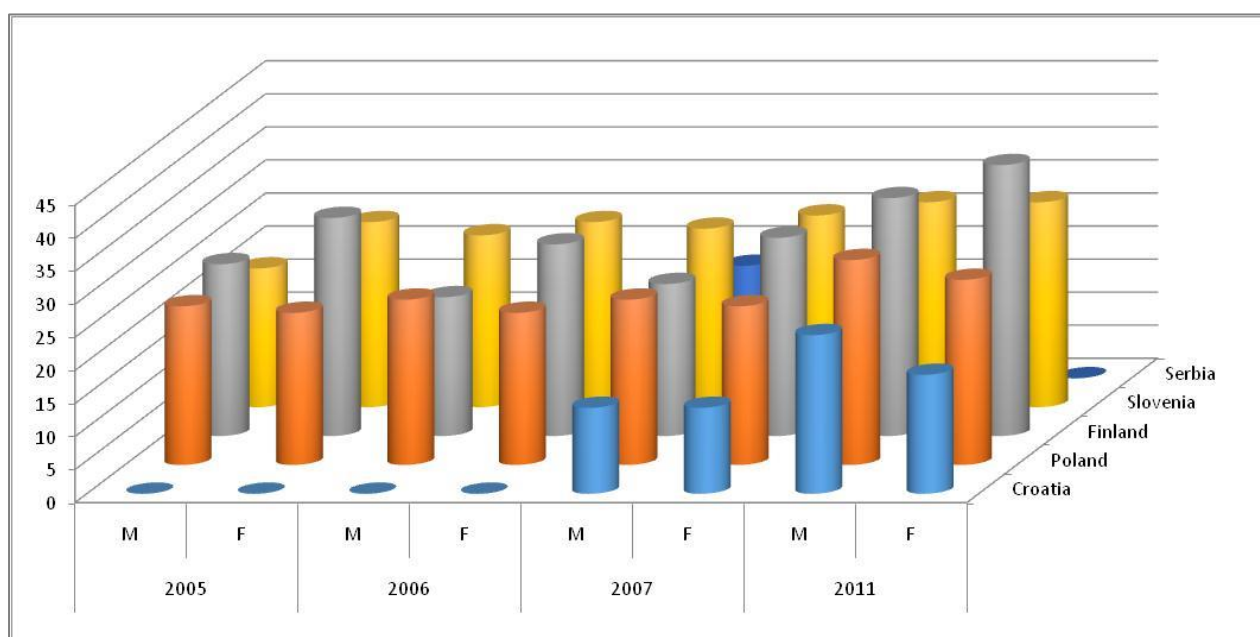


Figure 3.14 Individuals who obtained IT skills through formal educational institutions

3.3.3. Percentage of men and women with secondary education who have obtained ICT skills through formal education

There are very small differences between sexes considering percentage of men and women with secondary education who have acquired ICT-related knowledge through formal education. Finland and Slovenia are similar according to this indicator, followed by Croatia and Poland, Table 3.15 and Figure 3.15. Serbia has no historical review of this indicator, therefore it is not comparable.

Table 3.15 Percentage of men and women with secondary education who have obtained ICT skills through formal education

	2005		2006		2007		2011	
	M	F	M	F	M	F	M	F
Croatia	:	:	:	:	14	18	26	19
Poland	17	17	18	17	19	18	23	21
Finland	27	37	21	30	24	34	36	42
Slovenia	21	29	24	29	27	31	28	33
Serbia	:	:	:	:	17	20	:	:

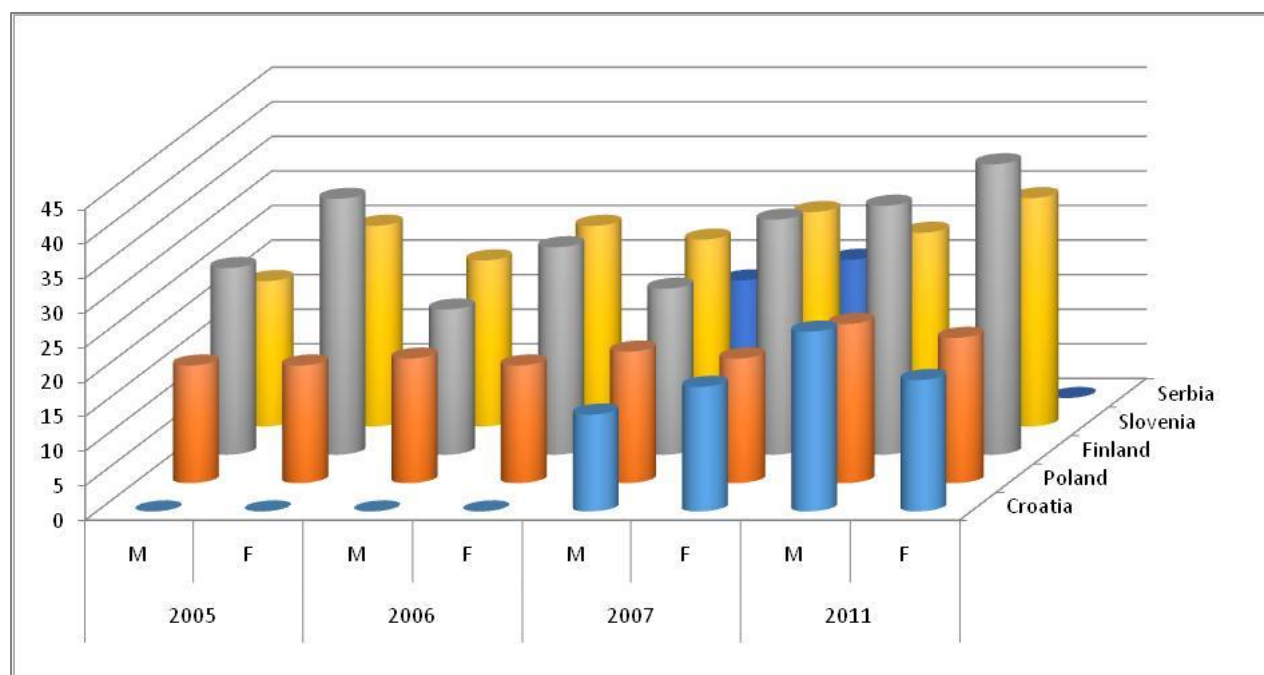


Figure 3.15 Percentage of men and women with secondary education who have obtained ICT skills through formal education

3.3.4. Percentage of men and women with higher education who have obtained ICT skills through formal education

Due to the lack of data for Serbia (data exist only for one year) trend of this indicator cannot be observed. According to this indicator, Slovenia and Poland are dominant in comparison to other countries, Table 3.16 and Figure 3.16.

Table 3.16 Percentage of men and women with higher education who have obtained ICT skills through formal education

	2005		2006		2007		2011	
	M	F	M	F	M	F	M	F
Croatia	:	:	:	:	24	20	40	37
Poland	36	37	41	42	44	41	51	48
Finland	25	33	22	31	23	31	40	47
Slovenia	:	48	39	50	42	49	52	48
Serbia	:	:	:	:	30	27	:	:

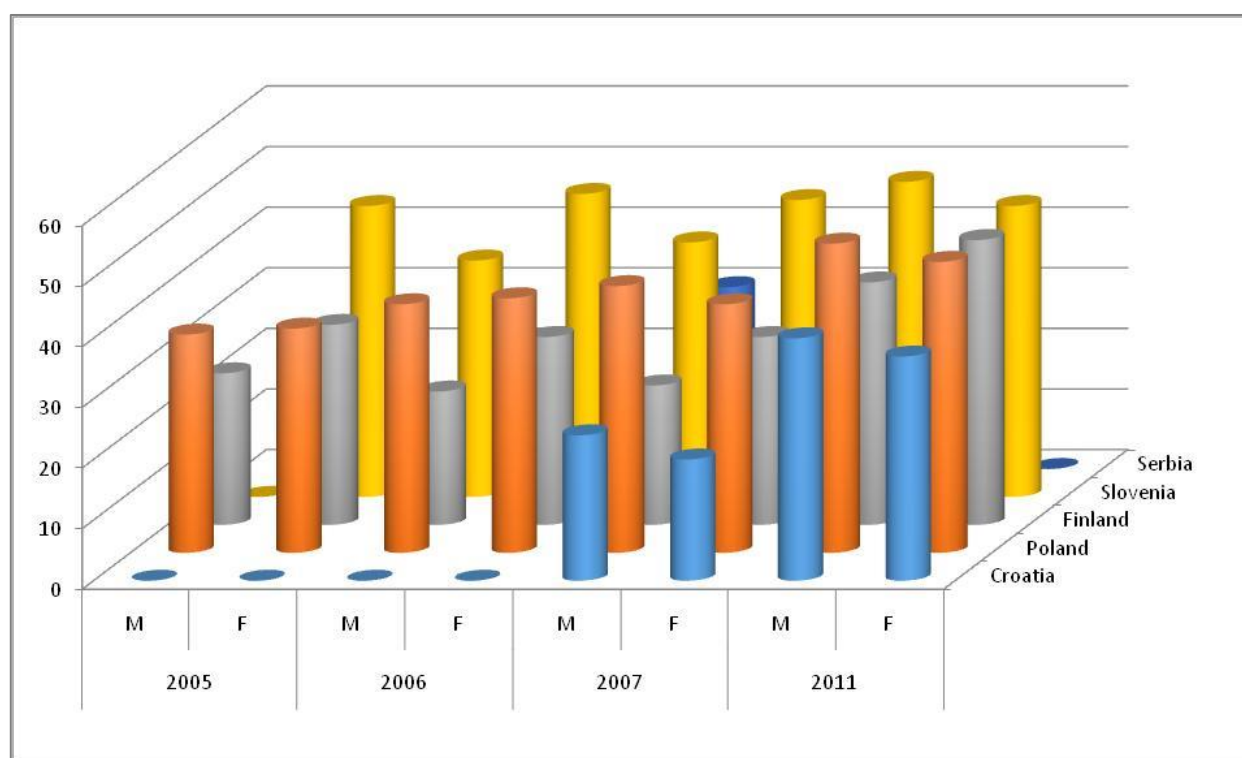


Figure 3.16 Percentage of men and women with higher education who have obtained ICT skills through formal education

3.3.5. Individuals who have obtained ICT skills through self-study (learning by doing)

According to this indicator Finland is once again dominant, followed by Slovenia, Poland, Croatia, and far beyond them Serbia. It is interesting to note that according to this indicator there are far more women than men in all countries. This indicator is shown in Table 3.17 and Figure 3.17.

Table 3.17 The percentage of individuals who have obtained IT skills through self-study

	2005		2006		2007		2011	
	M	F	M	F	M	F	M	F
Croatia	:	:	:	:	30	20	42	33
Poland	32	28	36	30	39	33	46	39
Finland	69	66	61	50	60	53	86	84
Slovenia	54	49	56	44	56	50	71	64
Serbia	:	:	:	:	18	14	:	:

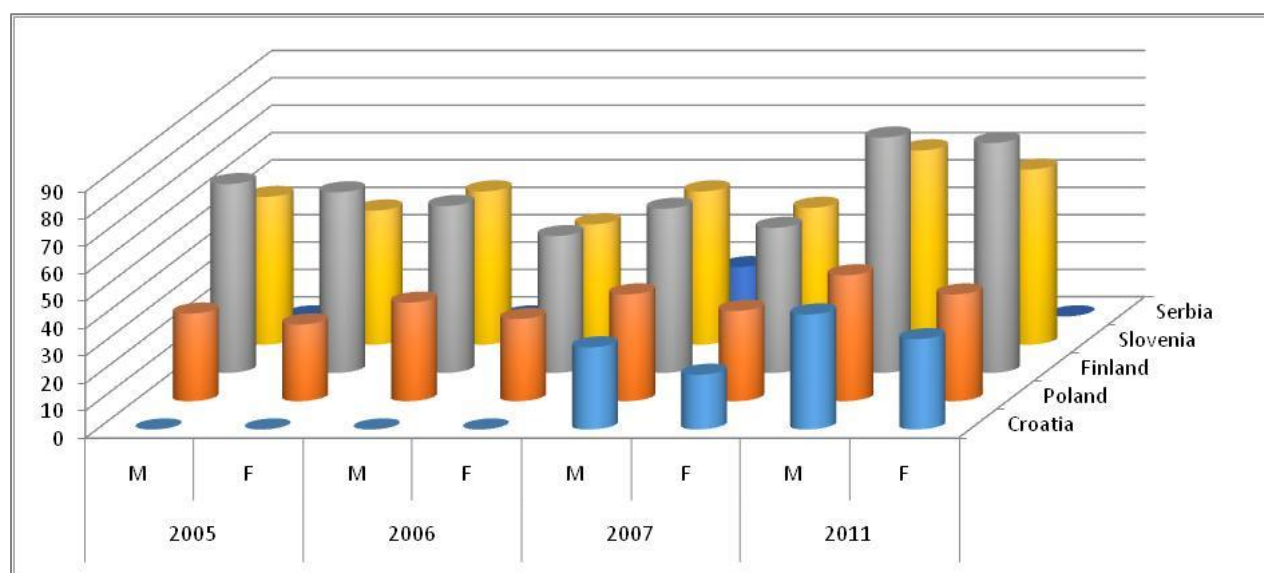


Figure 3.17 The percentage of individuals who have obtained IT skills through self-study

3.4. ICT enterprises

3.4.1. Enterprises that employ ICT/IT specialists

This indicator shows that ICT specialists are mostly employed by large companies, followed by medium, and, finally by small enterprises. Finland is still in the first position considering number of enterprises that employ ICT specialists, followed by Slovenia and Croatia, and finally Poland. For Serbia, this information is not available. The presentation of this indicator is given in Table 3.18 and Figure 3.18.

Table 3.18 Enterprises that employ ICT specialists

	All enterprises, without financial sector (10 or more employees)	Small enterprises, without financial sector (10-49 employees)	Medium enterprises, without financial sector (50-249 employees)	Large enterprises, without financial sector (250 or more employees)
Croatia	21	15	37	78
Poland	14	8	31	73
Finland	33	26	55	87
Slovenia	21	14	42	87

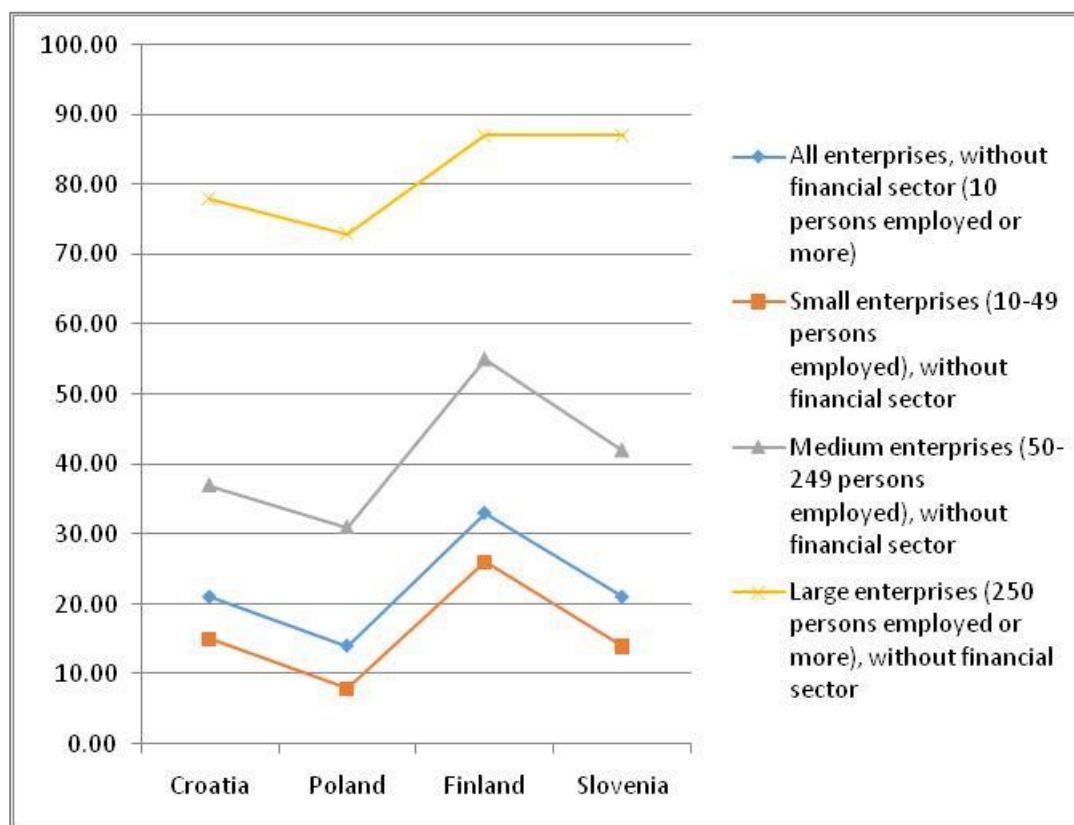


Figure 3.18 Enterprises that employ ICT/IT specialists

3.4.2. Percentage of individuals who used computer at work

The percentage of those who used computer at work is highest in Finland, followed by Slovenia, then Croatia and Poland. The data for Serbia is limited, but unfortunately, they show that Serbia is far behind other countries according to this indicator, Table 3.19 and Figure 3.19.

Table 3.19 Percentage of employees who used computer

	2007	2008	2009	2010	2011
Croatia	20	20	18	21	22
Poland	17	17	19	20	19
Finland	33	33	33	36	37
Slovenia	44	49	:	:	:
Serbia	12	:	13	:	:

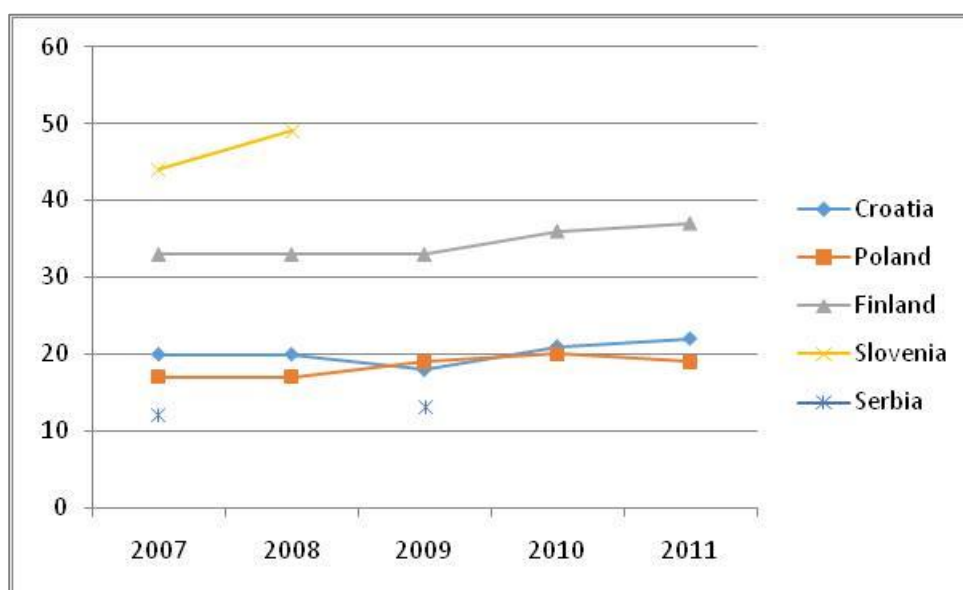


Figure 3.19 Percentage of employees who used computer at work

3.4.3. Percentage of enterprises receiving orders via internet

Croatia is dominant country in this comparison, followed by Serbia and Finland which are almost equal, and finally Slovenia and Poland, Table 3.20 and Figure 3.20.

Table 3.20 Percentage of enterprises receiving orders via internet

	2008	2009	2010	2011	2012
Hrvatska	18	27	24	22	27
Poljska	22	18	9	10	11
Slovenija	13	15	12	13	16
Finska	18	20	19	21	21
Srbija	20	20	21	21	21

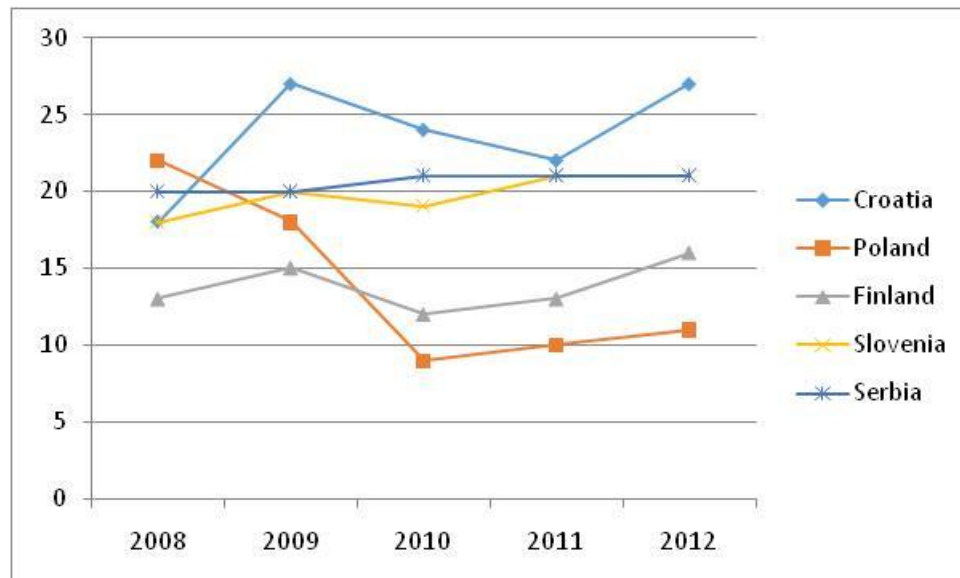


Figure 3.20 Enterprises received orders via computer network

3.4.4. Enterprises selling online

Serbia is the leader in comparison with other selected countries according to this indicator during the period of three years. Far behind are Croatia, Finland, Slovenia and Poland, which holds the last position.

Table 3.21 Percentage of enterprises selling online

	2008	2009	2010	2011	2012
Croatia	18	27	22	18	23
Poland	9	6	8	8	9
Finland	12	10	10	11	14
Slovenia	18	20	16	17	17
Serbia	22	23	32	40	40

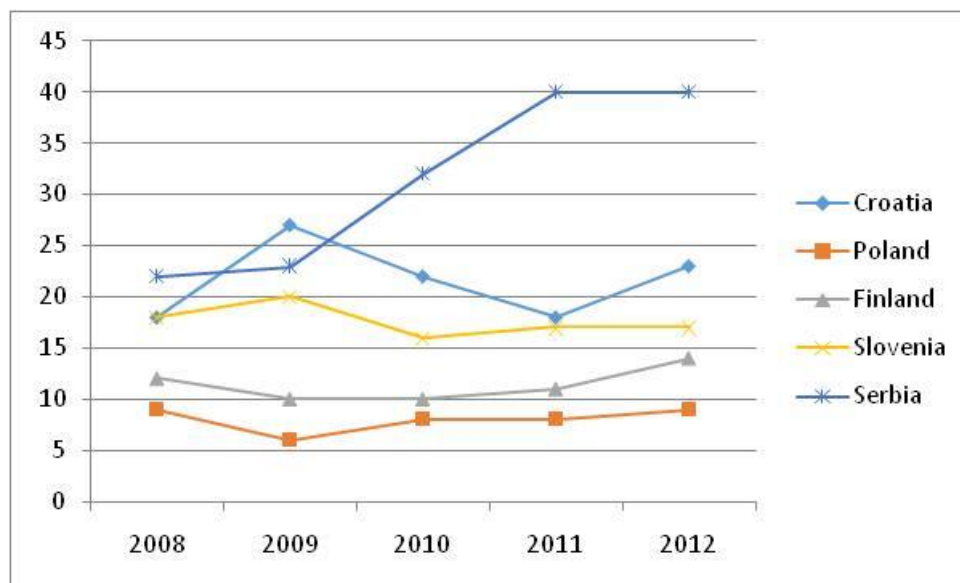


Figure 3.21 Enterprises received orders via computer network

4. REVIEW OF NATIONAL AND INTERNATIONAL INITIATIVES AND PROJECTS

Analysis and review of national and international initiatives (formal and informal projects, networks and campaigns) are prepared and presented in this Chapter. The period considered in this research was the last decade. Surveys of all initiatives and projects are given in following five tables, one table for each selected country. During data selection we had valuable cooperation from Marte Hozer-Kocmiel, University of Szczecin. Best practice examples, such as the Motorola Poland in education, and Telia Sonera, Finland in career development, are given in Annex 4. In the same Annex study of women in the ICT sector worldwide, which includes India, Korea, the Philippines, Russia, Argentina, Canada, America, France and Germany is presented.

All major initiatives and projects in Serbia, Finland, Poland, Slovenia and Croatia implemented in the last decade, which are related to the impact of ICT on women's labor market, are listed. The initiatives present the steps that considered countries have taken in order to promote women in the ICT labor market. All these initiatives and projects have in common an idea of empowering girls to get educated and, therefore, to be competitive in the ICT market. Another aspect common to all these countries is encouraging employed women not to give up on ICT activities and to participate in the programming and other traditionally male occupations.

There is a noticeable trend that countries that were EU members for many years, such as Finland and Poland, participate in the development of multinational initiatives and research, both regionally and at European level. There is no significant number of local initiatives and projects related to these countries, as is the case with countries that have lower level of gender awareness.

In practice, countries where the process of raising gender equality awareness is still in its infancy, have offices or directorates for gender issues. After this phase, activities of all offices are taken over by competent ministry.

Each table in the following text contains information about the name of the initiative or project, organization responsible for its realization, the year of implementation and a short description of the project/activity. After each table, a list of references that were used in the collection of all relevant information is given.

4.1. Initiatives and projects

4.1.1. Serbia

Name	Realized by	Year	Comment
Equally in the Information Society	NGO Equal Opportunities	2006	The aim of the project "Equally in the Information Society - Guidelines, checklists and examples of best practice" is to create a theoretical framework and the promotion of gender equality in the implementation of the National Strategy for Information Society. The project was developed with the support of the Fund for an Open Society Serbia.
General guidelines to highlight the importance of gender equality in designing the telecommunication policy	NGO Equal Opportunities	2006	This document provides the guidelines to highlight the importance of gender equality. They are designed for the bodies related to the legislation and regulations as well as decision makers in the telecommunications sector. General guidelines are planned to assist in the creation of telecommunications policy, so women and men equally be the part of this process, as well as considering the effects of the decisions made on gender equality.
National action plan for improving life of women and advancing gender equality	The government of the Republic of Serbia	2009	The strategy is the first policy document of Republic of Serbia in the field of gender equality. It defines goals, measures and actions that the Government will take from 2009 to 2015. In order to improve the status of women in all spheres of public and private life and they are based on contemporary international and European standards on equality between women and men. Some of the activities within the Strategy are about the establishment of the Center for Women's Entrepreneurship and ICT and increase their availability. The strategy defines the need for ICT courses, which would encourage young women to be engaged in these occupations. It is imperative to carry out the research on the impact of ICT on women's participation in the labor market. The Strategy is highlighted the importance of the stimulating measures for women in order to gain ICT knowledge. Special attention is given to the education of a teacher who will be able to continue the transfer of ICT knowledge to girls in local communities. Finally, it is necessary to provide access to ICT to all marginal groups, Roma people, rural and older women to use ICT.
European Charter on gender equality at the local level	Council of European Municipalities	2009	The Charter is dedicated to local and regional authorities, in order to direct their forces and partnerships to achieve greater equality.

	and region with partners		
Development of national action plan for advancing the position of women and promoting gender equality in the Republic of Serbia for the period from 2010 to 2015	NGO Equal Opportunities	2010	The objectives of the Action Plan on the implementation of the national strategy for improving the status of women and promote gender equality for the period 2010-2015 are better economic status of women, their greater participation in decision-making and the elimination of gender stereotypes. The Action Plan defines the following activities: Establishment of Center for Women's Entrepreneurship and ICT and increase their accessibility, training women in modern business, encouraging the girls and young women to opt for a profitable profession through the organization of ICT courses, organization of training on the use of modern technology and availability of ICT, conducting research and providing official data on the impact of ICT on the position of women in the labor market, organization of seminars for teachers and administrative staff at all levels of education, increase women skilled for the ICT application, especially in less developed and rural areas.
Digital women entrepreneurs of Serbia	NGO Equal Opportunities	2011	The result of the project is free training for trainers with the aim to disseminate knowledge which is necessary for actively joining in the conduct of business by applying and using the IKT.
Participation of women in science and technology	NGO Equal Opportunities	2012	The idea of the project was to open the discussion about the participation of women in science and technology with the aim to strengthen the motivation of school girls in the subsequent choice in science and technology. In addition, the project aims to eliminate prejudices that hinder young women to develop the professional career in ICT fields.
Developing and implementing the project of establishing five e-clubs for rural women in Serbia	NGO Equal Opportunities	2012	The result of this project is the establishment of five women's clubs in five municipalities, for 25 women. Each club have its own premises, computers, internet connection and five women who attended the seminar and trained to further develop e-club activities in their communities. The main objective of the project is that women in rural areas can bridge the "digital gap" and improve living conditions.
Academic study: Where are the women in IT sector?	University of Belgrade, Authors: MSc Ana Pajić Prof. dr. Dragana	2012	The study was realized as the online survey, in which women were contacted via e-mail. The target group was the female population that works in the field of information systems and technology. The main objective of the research was to define the general status of women in the IT profession in

	Bečejski-Vujaklija Prof. dr. Nataša Gospić, Prof. dr. Jelica Protić		Serbia. The conclusion was the fact that the market differently treated male IT engineers than female. First results show that women in the ICT sector in Serbia are the minority and that they face certain challenges and obstacles than men.
Participation of women in science and technology: challenges, opportunities and way forward	NGO Equal Opportunities	2013	The idea of the project is to open the discussion about women in science and technology, with the aim to motivate the girls of high school for selection of technical professions.

4.1.2. Finland

Name	Realized by	Year	Comment
Training and Employment of Women ICT Technicians: a report of the JIVE MCSE project	Funded by the European Social Fund EQUAL programme and The Open University as part of the JIVE partners project. JIVE – Joint Interventions; MSCE – Microsoft Certified Systems Engineer	2005	This study focuses on the experiences of women ICT workers in other sectors and industries, particularly ICT support staff and techniques. Key finding of the research was that there is no breakdown of gender statistics for those with this qualification in the UK, and indeed no obligation for providers of vendor specific certifications to collect or publish such data.
“WomenIT – Women in Industry and Technology” project	University of Oulu, Research and Development Centre of Kajaani	2006	The aim of the WomenIT – equal opportunities for women and men in work as well as in education; supporting women and girls towards choices that are non-traditional for their gender; supporting the employment of women and girls in the fields of technology and industry; dismantling structures which generate inequality between sexes.
Statistical portrait of women in ICT in BSR countries – WINNET8	WINNET8	2010	The empirical analysis of the situation of women in the labor market, including the issue of ICT showed very strong differences between the 9 Baltic Sea Region (BSR) countries. There is a distinct divide into two groups: wealthy northern countries - Norway, Sweden, Denmark and Finland, whereas the second group includes: Poland, Lithuania and Latvia. Strong differences by age prevail among women and their computing activities and skills. There is a long way to meet criteria of an active participation of women in some of BSR countries.
Quadruple Helix Central Baltic	Central Baltic Interreg IV-A programme	2009 – 2011	Focus on gender equality, entrepreneurship and ICT innovations. There were eight partners from three countries who have come together to strengthen the central Baltic Sea area. The purpose of the report is to analyze the gender gap in entrepreneurship, with special attention on Baltic sea region.
Women in net 8 (winnet8.eu)	European Regional Development Fund	2010 – 2011	The project involves regions in 8 members, Bulgaria, Finland, Greece, Italy, Poland, Portugal, Sweden and UK engaged in policy development to address the problems with low employment rates among women in combination with horizontally segregated labor markets and the lack of women in entrepreneurship, innovations and technology.
Increased growth with gender equality and diversity as tools Mata Jamt Project	Interreg IVA North, Norrbotten County Administration, Regional Council of Lapland	2010-2013	The project aims to support the business development and innovation process of new services and products in ICT sector. The project is expected to expand women’s influence on IT development and ultimately create new jobs for both women and men, thus making northern Finland and northern Sweden more attractive regions.
Women and Gender Equality in Finnish Development	Ministry for Foreign Affairs of Finland	2011	The aim of Finnish development policy and cooperation is to eradicate poverty and empower ordinary people – women and men, girls and boys –

Cooperation			to strive towards economically. The potential for ICT to break down barriers to knowledge, political participation and economic opportunity is vast. ICT is not gender, income, status or age neutral. It impacts men and women differently and in almost all cases women have less access to, and use of, the new opportunities provided by it.
GENOVATE – Transforming organizational culture for gender equality in research and innovation	FP7-funded [under Science in Society SiS 2012. 2.1.1-1 programme] action research project which is coordinated and led by Professor Uduak Archibong of the University of Bradford	2012	GENOVATE seeks to ensure equal opportunities for women and men by encouraging a more gender-competent management in research, innovation and scientific decision-making bodies, with a particular focus on universities. GENOVATE seeks to implement strategies for the transformation of organizational structures towards more gender-competent management.

4.1.3. Slovenija

Name	Realized by	Year	Comment
Women mayors' link: connecting local governance, ICT and gender	Equal Opportunities for Women Foundation	2003	This is an initiative developed in 12 countries and territories, including Slovenia and Serbia. One of the main aims was to promote the use of ICT among members to improve local and community governance and to promote gender issues within constituencies.
Resolution on the national program for equal opportunities for women and men, 2005-2013	The National Assembly of the Republic of Slovenia	2005	The Resolution on the National Program for Equal Opportunities for Women and Men is a strategic document which defines objectives and measures as well as key policy makers for the promotion of gender equality in different areas of life of women and men in the Republic of Slovenia in the period 2005 - 2013. An important role in overcoming gender stereotypes is played by the education system. By the development of ICT, the flow of information and knowledge is increasing, therefore it is important that such knowledge is free of prejudice and stereotypes concerning the roles of women and men in the modern society and that it promotes equal opportunities of both genders.
ICT and their contribution to active ageing and equal opportunities in work and employment: Slovenia	Vesna Dolničar, Vasja Vehovar	2005	The book presents analysis of main contributions of ICT knowledge to equal opportunities in work and employment in Slovenia.
Consideration of reports submitted by States parties under article 18 of the Convention on the Elimination of All Forms of Discrimination against Women – Slovenia	UN Committee on the Elimination of Discrimination Against Women (CEDAW), Government of Slovenia	2007	This report presents in particular the developments that have occurred in the implementation of the provisions of the Convention as well as the information and data requested by the Committee on the Elimination of Discrimination against Women This report shows that share of male students substantially exceeds the share of female students in technical and science studies, mathematics and computer sciences.
E-Counseling	ESS, E-Counseling project-European Commission	2007	The aim of this project were to develop of integrated e-information and counseling support for job seekers and all who are interested in vocational/ career guidance. This project was the first of all designed for those who can use ICT for research and

			planning in their career and vocational development.
Report on the Gender Initiative: Gender Equality in Education, Employment and Entrepreneurship	OECD Council at Ministerial level	2011	This is the report from the 2011 Meeting of the OECD Council at Ministerial level. It represents the first milestone in the Gender Initiative, which was launched by the OECD to help governments promote gender equality in Education, Employment and Entrepreneurship. One of the lessons for gender equality in entrepreneurship is to foster women entrepreneurs' access to international markets and business networks, including through the use of web technologies.
A Bright Future in ICTs Opportunities for a new generation of women – Report	Telecommunication Development Sector	2012	This summary report surveys the global trends in women's professional development and employment in the information and communication technology (ICT) sector, and offers a sample of the range of national policies, training programmes and initiatives targeting girls and women as potential students and professionals. The report is related to OECD countries (Slovenia is the member).

4.1.4. Poland

Name	Realized by	Year	Comment
makeITfair Production of Next-Generation Electronics in Poland - Gender Perspective	Karat Coalition	2007	The project analyses the situation of women employed in electronic industry in Poland. They conclude that the working conditions of women, and particularly their wages are not at a satisfactory level
OECD: ICTs AND GENDER	Directorate for Science, Technology and Industry, Committee for Information, Computer and Communications Policy	2007	This document provides an overview of the gender distribution of ICT and ICT-related employment in OECD countries, including Poland. The document then focuses on participation in ICT-related education and training, and differences in ICT access and use by gender.
Women and ICT Why are girls still not attracted to ICT studies and careers?	Cisco	2009	This paper looks at how careers in ICT and, in particular, Internet Networking, are perceived by male and female school children aged around 15 years, their parents and their teachers. The study was conducted in 5 EU countries: France, Italy, Netherlands, UK and Poland. The key finding is that the perception of careers in ICT and internet networking does not match reality and that often parents and teachers perpetuate this misperception.
Statistical portrait of women in ICT in BSR countries	University of Szczecin, Poland	2011	This project promoted women's participation in ICT taking into account how strongly Baltic Sea Region countries differ.
Mechanisms for reconciling professional and family roles for women and men as a chance to actively participate in the labour market	Polish Presidency- Ministry of Labor and Social Policy	2011	The Expert conference acted as a forum for determining the best policies and initiatives aimed at ensuring gender equality on the labor market by the governments and the social partners.
UNESCO/POLAND Co-Sponsored Fellowships Programme in Engineering - cycle 2013	UNESCO Chair for Science, Technology and Engineering Education at the AGH University of Science and Technology, Krakow, Poland	2012	Promoting human resource capacities in the developing countries and enhancing international understanding and friendship among nations. Beneficiaries of these fellowships will be given the opportunity to undertake an individual research programme in the field of Science, Technology and Engineering. Among all, one of the field of research was software engineering.

ICT-Go-Girls	European Commission LLP program	2012	Its main goal is to empower secondary school girls with the knowledge, skills and values to help them be able to create future opportunities for innovation and quality ICT related employment. The experts behind this project belong to 7 institutions from 5 European Countries.
Girls in new technologies - summary of the first edition	Office of electronic communication, Republic of Poland	2013	A conference summarizing the first edition of the contest for "Traineeship in the ICT branch for female students" was held in Warsaw. The meeting was accompanied by short presentations thanks to which all participants could get information on the first days of traineeship programmes undertaken by the students.
Baltic Sea Region Partnership Platform for Gender & Economic Growth	Winnet Europe organization	2013	A Baltic Sea Region partnership platform with focus on Gender-Innovation-Entrepreneurship and ICT, where women's participation will be secured through Women Resource Centers as an actor in co-operation within the partnership as civil society actors.

4.1.5. Croatia

Name	Realized by	Year	Comment
The Role of Women in the Croatian Information Society	The Central State Office for e-Croatia	2010	The round table was held to promote the importance of equal participation of women in the ICT sector, as well as to encourage the recruitment of more women in this important sector of entrepreneurship.
European network of female entrepreneurship ambassadors, EntrepreneurSHEp Croatia	Croatian Chamber of Economy	2011	The project aim was to establish a network of female ambassadors in Croatia, which would encourage women to start their entrepreneurial activity and to found their own company, as well as raising awareness of women's entrepreneurship. During the project, workshops were held along with trainings about the e-business, creating a web site and etc.
National Policy for Gender Equality	The Central State Office for e-Croatia	2011	National Policy for Gender Equality is a basic strategic document of the Republic of Croatia with the aim to eliminate discrimination against women and to establish real equality by applying a policy of equal opportunities for the period from 2011 to 2015. Initiatives that are planned for 2011-2015 are related to two issues: women's employment in the ICT sector and the exchange of experiences and good practices in the ICT sector, as well as organizing a conference about women in the ICT sector. Implementer of these initiatives was the Central State Office for e-Croatia.
European week of ICT occupations and digital competence - eskills Week	Ministry of Science, Education and Sports	2012	This is an initiative that is being implemented in 35 countries simultaneously, and Croatia has joined, also. The task of the initiative is to inform pupils, students, young professionals, retirees, entrepreneurs, employers and policy makers on a range of possibilities that information skills and ICT occupations offered, as well as to raise awareness of the advantages of increasing the overall computer literacy of citizens.
Women and ICT - Why chose career in the ICT sector?	Association CESI i Girl Geek Dinners Croatia	2012	The organization of the workshop was inspired by the international initiative, eSkills, which has been taking place simultaneously in 35 countries in Europe with the aim of sensitizing the public due to the importance of investing in computer literacy of citizens and to promote ICT occupations and careers.

Measures against violence against women	EU program for employment and social solidarity - PROGRESS	2013	This paper aims to present the Croatian general context concerning measures to fight violence against women (VAW) with a specific emphasis on the use of ICT in combating VAW and domestic violence perpetrators programmes, current policy debates relevant for Croatia as well as transferability issues of good practices from Spain and Ireland.
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4.2. Summary of the situation in the surveyed countries

This chapter presented all relevant data (statistical data and important initiatives) from five countries: Serbia, Poland, Finland, Croatia and Slovenia.

The general conclusion is that Finland is the most dominant country in terms of women in the ICT sector. Finland was the first country in the world that started dealing with the gender issue. This fact leads to the present situation that the president, prime minister and 11 of 20 ministers are women. Finland justifies its dominance by following information:

- All Finnish enterprises (100%) use ICT, computers and Internet.
- The percentage of persons who have never used ICT is the lowest comparing to other countries.
- The percentage of enterprises that employ ICT/IT specialists is the highest.

Poland is traditional catholic county as well as patriarchal society and this defined women position in labor market in the past. Becoming EU member, Poland has made good progress in gender equality. Unfortunately, until today the working conditions of women in ICT and particularly their wages are not in line with those available to workers in other, in particular „old” EU states. According to official Eurostat statistic, Poland is the worst ranked country by the number of enterprises that employ ICT specialists.

The Slovenian government after joining EU made an effort in order to protect and promote women's rights and participation in the workplace and in political life. The current situation in Slovenia shows that the third of all managers and senior officials' are women. Since major gender issues are resolved, the Office for Equal Opportunites was abolished in 2012. The area of equal opportunities is shifted to the Ministry of Labour, Family and Social Affairs.

In ICT sector in Croatia 34% of all employees are women, while 28% of this number being female ICT managers. The main barrier for more active participation of women in the ICT sector is the stereotype of ICT jobs as traditional male occupations. There is a lot of work to be done in Croatia, since the official statistics shows high percentage of male and female with higher formal education that have never used computer.

Finally, the situation in Serbia is at a low level. The number of women in positions of decision-making, but also to other jobs in the IT sector is negligible. Although women achieve better results during training in the ICT field, still do not get the chance to stand out during their business career. Most of the initiatives and projects in Serbia come from the Gender Equality Directorate and NGO Equal Opportunities.

5. REVIEW OF EXISTING REGULATORY AND STRATEGIC APPROACHES AND NETWORKING BEST PRACTICE EXAMPLES

In this Chapter review and analyse of some of the existing documents, such as strategies, regulations, initiatives and activities undertaken in most prominent institutions around the world, as well the networks that constantly promote the role of women in ICT sector were discussed. Here we will not conduct quantitative analysis of these documents and initiatives, but we will rather point out the flaws that come from adoption of documents taking into consideration principle of gender equality. We will also present some examples of best practices, primarily from Serbia, but also from other countries

5.1. Existing regulations

It is not unusual that participation of women in certain spheres of social, economic and political life is prescribed by specific regulatory acts. Through this indicator we researched if regulations regarding women's ICT use exist in Serbia. After detailed research we concluded that in Serbia there are no regulatory acts that regulate or direct women's ICT use. In general, only Election Law of Republic of Serbia (RS) has provisions that stipulate quotas for participation of women in elections. Civil society organizations launched activity to adopt a decision on having 30% or more women in the Parliament. But, in regard of importance of ICT for women privacy and safety of women on the Internet always present a side effect. ICT safety and security issues are covered by several legal documents and regulations (Law on Electronic Commerce, Law on Electronic Signatures, Law on Electronic Documents, Regulations concerning detailed conditions for issuing of electronic signatures, Regulations concerning issuing of timestamp)⁷. However, none of these documents is gender-sensitive nor it specifically deals with aspect of women. In that sense, we formulated the recommendation: *Integrate gender equality principle in legal and regulatory framework, especially in documents related to safety and security issues of ICT use.*⁸

⁷Zakon o elektronskoj trgovini, Službeni glasnik RS, br. 41/09,

Zakon o elektronskom potpisu, Službeni glasnik RS, br. 135/04

Zakon o elektronskom dokumentu, „Službeni glasnik RS” br. 51/09

Pravilnik o bližim uslovima za izdavanje elektronskog potpisa, Pravilnik o izdavanju vremenskog žiga, Službeni glasnik RS, br. 26/08

Pravilnik o izdavanju vremenskog žiga, Službeni glasnik RS, br. 112/09)

⁸Hafkin, Nancy. “Globalization and the economic empowerment of women: Defining and building a gender-responsive information society in the ESCAP region”. UNESCAP. 2004. 6-7. Online.
<http://www.unescap.org/esid/GAD/Events/High-level%20meeting%20Sep%202004/English/Nancy%20Hafkin.pdf>

5.2. Initiatives, strategies, action plans, projects

Initiatives and strategies can also indicate level of development of social and institutional consciousness concerning specific issues. By analysing existing initiatives and strategies aimed at increasing participation of women in ICT sector or raising their ICT literacy level, we found the following:

- a) **National strategy for improving the position of women and promoting gender equality** and related National action plan are probably the only strategic documents that directly refer to importance of economic strengthening of women and improving life by acquiring ICT knowledge and skills. It explicitly states: "...Women should be made capable of running modern business operations in order to provide them with an opportunity for successful work, and especially for entrepreneurship. Girls and young women should be encouraged to choose new professions through ICT courses, courses on business plans development, marketing, management and stock exchange operations. Pay special attention to modern technologies, trainings for ICT use and IT availability..."
- b) Digital agenda for Serbia consists of two strategies – **Strategy for information society development 2010-2020**⁹ and Strategy for electronic communications development by 2020¹⁰. None of these strategies is gender-sensitive and none of them refer to role of women in ICT sector or importance of ICT for economic strengthening of women and vulnerable groups.
- c) Since 2006 Statistical Office of the Republic of Serbia publishes annual reports on **Usage of information and communication technologies in the Republic of Serbia**. Majority of statistical data is presented by gender and comments are made in that sense, so it is a good source for assessing gender division in Serbia relating to ICT¹¹.
- d) **Strategy on Development of E-government in the Republic of Serbia for period 2009-2013, Government of the RS October 2009**¹². Although this electronic service is of great importance for improving the position of women, both in personal and business way, Strategy doesn't consider women separately but instead uses the term "citizens" and gives general directions on increasing computer literacy of public administration employees.
- e) **National Employment Strategy for period 2011-202, Government of Republic of Serbia, 2011**¹³. This document recognizes gender aspect in the employment process to great extent, although it doesn't directly refer to the role of ICT in that process, but it refers to development of local women employment programmes. Strategy concludes that women are struck by unemployment more than men despite having higher education, that on the labour market there are persons that are particularly vulnerable (not only during recession) – e.g. uneducated women from rural areas (gender, educational and geographical vulnerability),

⁹http://mtt.gov.rs/download/3/Strategija_razvoja_informacionog_drustva_2020.pdf

¹⁰<http://mtt.gov.rs/download/3/Strategija%20razvoja%20elektronskih%20komunikacija%20u%20RS%202010-2020.pdf>

¹¹<http://webzrs.stat.gov.rs/WebSite/public/PublicationView.aspx?pKey=41&pLevel=1&pubType=2&pubKey=1941>

¹²http://mtt.gov.rs/download/3/Strategija_i_akcioni_plan_za_razvoj_elektronske_uprave.pdf

¹³<http://lokalnirazvoj.rs/nacionalna-strategija-zapošljavanja-2011-2020.htm>

that women are the largest vulnerable group in the labour market of the Republic of Serbia, and although they represent half of working-age citizens, they are a minority on the labour market and a distinct minority among employed persons. According to this strategy there are large areas for improvement of gender sensitivity in creating and monitoring of programmes that are active in labour market of the Republic of Serbia, and this type of approach would not only contribute to reducing of differences between men and women on labour market, but it would also improve efficiency of using funds for active programmes, especially if relative share of training programmes in labour market active programmes is increased. According to the records of National Employment Service more women than men are unemployed, but situation is different on local labour markets and in some municipalities there are more unemployed men. Considering the differences on local labour markets, special programmes for women employment should be developed within local employment action plans and especially in the areas where women are in a less favourable position than men. Unemployment rate of young women is especially high, while their employment rate is low. Because of that, measures being devised should primarily be focused on unemployed young women, up to 30 years of age, with no professional experience compared to men of the same characteristics.

- f) In **National action plan on employment, 2013**, chapter III, Objectives and Priorities, in part 4, women are classified in unemployable group. There is a plan to create and implement specific measures and activities in relation to this group, but there is no mention of ICT. Chapter 7 states that women have priority in relation to integration in measures of active policy of employment, and in the Table of priorities, measures and activities for realization of National action plan on employment in parts 4.5 and 4.6 activities on employment of women from rural areas and women in general are listed in particular. But even within these specific activities there is no mention of new technologies and better market positioning.

5.3. Institutions, NGO, Networks engaged in promotion of ICT for women

5.3.1. Institutions

1. Ministry of Foreign and Internal Commerce and Telecommunications, which includes Directorate for Digital Agenda of Serbia, creates strategy and policy for development of information and communication technologies, while regulatory work is done by regulatory institutions, such as RATEL and RRA. Besides engagement of Ministry in promoting of international day "Girls and ICT", there were no other activities concerning ICT and women issue. As mentioned earlier, there is no strategy that focuses particularly on the position of women and role of ICT in improvement of their lives. We should mention that Strategy for Information Society Development from 2006 included a number of strategic directions concerning gender equality, but gender equality completely disappeared from new strategies. Because of that we think that abovementioned recommendation is important and should be implemented.
2. Ministry of Labour, Employment and Social Policy and its Gender Equality Directorate continually support and promote role of ICT for women and National strategy for improving the position of women and promoting gender equality and followed National Action Plan are good examples

5.3.2. CSO

There are several NGOs in Serbia engaged in promotion of ICT:

- **NGO Jednake mogućnosti**¹⁴ (Equal opportunities), since its foundation in 2002, it has been engaged in solving women and ICT issues, promotion of ICT in improvement of women's life. We should note the following projects:
 - Project Gender Equality in Building Up Information Society- Guidelines, checklists and examples of best practices in gender equality.
 - Establishment of e-clubs
 - Free training for teachers from rural areas
- **Serbian Society for Informatics (DIS)**¹⁵ is the oldest association of IT professionals in Serbia. It was founded in 1973. Society's mission is popularization of ICT application, affirmation of domestic ICT results, assessment of situation in the field of ICT and proposing necessary measures accordingly. Prominent female experts are represented in management bodies of DIS (society vice-president and 5 of 12 members of Board of Executives are women). DIS plans to establish a women's informatician section, which will be engaged in promotion of position of women in IT sector and popularization of IT professions among female high-school graduates.
- **Information Society of Serbia**¹⁶ This society is engaged in popularization of information society and technology, dissemination of information from this field, organization of symposiums, conferences and various training courses, and it takes part in projects dealing with IT issues. During International Conference YUINFO this society almost always held sessions concerning women and ICT.
- **e-Development association**¹⁷ is engaged in accomplishment of objectives relating to information society development, but doesn't treat the question of women and ICT.

5.3.3. Networks

There is no registered network in Serbia that is engaged in question of women and ICT or promotion of ICT. Social networks are used for this purpose, and a good example could be network created on Facebook by women from five e-clubs in rural areas. Establishment of e-clubs created conditions for women that have been trained for use of computer, access to Internet and networking to use these tools to access the market or become self-employed.

5.3.4. International institutions and activities

International Telecommunication Union – ITU

ITU is globally recognized institution for ICT standardization and development issues. ITU standing on gender equality issue is verified by ITU Council decision: "ITU Gender Equality &

¹⁴www.e-jednakost.org.rs

¹⁵www.dis.org.rs

¹⁶<http://www.informacionodrustvo.org/sr/onama/index.dot>

¹⁷<http://www.erazvoj.com/>

Mainstreaming (GEM) Policy". Decision aims to promote a shared vision for integrating a gender perspective in throughout ITU. It also helps bring ITU into line with the UN System-Wide Action Plan (UN-SWAP) on gender empowerment. When considering ICT development and widespread internet access ITU pays special attention to impact of ICT on life of women. Special Report "A bright future in ICT opportunities for a new generation of women, 2012", discusses new ways of working in and with ICT sector, new jobs, possible interactions and learning for women¹⁸.

ITU opened a web portal Girls in ICT which aims at helping girls and women access trainings, work and career possibilities in ICT sector.

ITU is in charge of the activities of World Summit on the Information Society - WSIS. Forum 2013: "Measuring ICT and Gender" was held as part of the Summit. In the Forum there were discussions on statistical data relating to women and ICT statistics and usage and benefits of ICT

European Union

In the Digital Agenda for Europe and during related discussion, Neelie Kroes, vice-president of EU Council noted that by 2015 Europe could face a shortage of up to 900 000 trained ICT experts. Study "Women active in the ICT sector"¹⁹ shows that more women employed on digital jobs could create annual EU GDP in the amount of 9 billion euro.

Digital Agenda for Europe in "Pillar VI Enhancing computer literacy, skills and inclusion", and related activity plan I activity 60 deals with "Increase the participation of women in the ICT workforce". They plan actions related to identifying tools for attracting more women for ICT jobs, empowering women for full participation in Information Society.

5.4. EXAMPLES OF BEST PRACTICES OF WOMEN NETWORKS

- **Global Network of Women ICT Decision-Makers** It was created on initiative raised and proposed by Serbia during Plenipotentiary Conference in Guadalajara with an aim to introduce gender equality principles into ITU activities and to promote gender equality and empowerment of women through ICT use²⁰.
- **European Centre for Women and Technology (ECWT)** is European network of more than 130 organizations and large number of individuals that aims to implement strategy of full participation of women in society and economy knowledge through national contact points, and to make gender equality aspect one of the aims in the Digital Agenda of Europe²¹.

5.5. Trainings and education of women on ICT use

This part shows that there are certain training programmes for women relating to ICT use and that ICT use for women is being promoted. It is very likely that there is a number of programs that weren't included in this review, since we used available documents from the web sites.

¹⁸ ITU Report „Bright future in ICT opportunities for a New generation of women", 2012.

<http://girlsinit.org/trends-analysis-and-profiles/bright-future-icts-opportunities-new-generation-women>

¹⁹ published by [DG CONNECT](http://ec.europa.eu/digital-agenda) in October 2013 <http://ec.europa.eu/digital-agenda>

²⁰ www.itu.int

²¹ <http://www.womenandtechnology.eu/digitalcity/projects/w4ict/homepage.jsp?dom=AAABECDQ&prt=BAAFKZBW&fmn=BAAFKZCC&men=BAAFKZBX#sthash.Z8XqRdXr.dpuf>

- **National Employment Service:** It organized training programmes for specialization or gaining additional qualification in accordance with existing needs of local labour markets. Less employable persons - meaning persons unemployed for more than 12 months, unemployed persons with no qualifications, persons below 30 years old, women, rural population, persons with disabilities, Roma people and social assistance recipients - have priority access to these trainings. Even in these trainings there is no mention of ICT and women, although National Employment Service held a number of computer trainings. As women are classified in priority category of unemployable persons, they took part in these trainings.
- **NGO Jednake mogućnosti (Equal opportunities)** organized training for school teachers, teachers from homes for children without parental care and children with disabilities in the period 2002-2005. ICT use trainings for unemployed women or women that lost their job were organized during 2005 in cooperation with Center for Democracy Foundation and Municipality of Novi Beograd (New Belgrade). Computer and network training for 25 women from rural areas was organized as part of the project "Establishment of 5 e-clubs in rural areas of Serbia".
- **Belgrade Open School - BOS²²** is engaged in additional education and training of leaders of social change, professional support for institutions, research and development of public policies with an aim to build modern community base on democratic values. BOS organized large number of computer training courses, but was no specific training for women.
- **Companies Cisco Serbia and Cisco Networking Academy at School of Electrical Engineering in Belgrade²³** had four projects "Cisco F_email project for prequalification of unemployed women" with an aim to offer unemployed women a possibility of professional reorientation through free Cisco CCNA course and soft skills training. Main objective of this project is in accordance with long-term strategy of Cisco® company which aims to invest in women's education and increase number of women employed in the field of science and information technology. Some of F_email project participants now work for companies such as Saga, SBB, IBM, Telefonija, RRC and other, and information that over 60% of F_email project participants from previous generations found employment while they were still in training is imposing. Currently, 40 instructors work in academies in Serbia and 17% of them are women.
- **"Novi Svet" Society ("New World")²⁴** in cooperation with IAN International aid centre Telecentar organized two-months free of charge computer training from 06.08.2012.(Windows-Word-Excel-Internet), for all, but it was not any specific training for women to improve their position on labor market.

²²<http://www.cdspredlaze.org.rs/default.asp?Category=5&Static=seko>

²³www.cisco.akademija.etf.rs

²⁴www.novisvet.24.eu

6. LABOR MARKET AND ICT-RELATED KNOWLEDGE

Chapter *Labor market and ICT-related knowledge* is created as a result of comprehensive analyses of the current situation on the labor market, and trends in development of necessary ICT knowledge and skills. The key objective of the chapter is to identify the main directions of future developments on the labor market in Serbia through analyzing global trends. Also, the aim is to highlight the current situation in the labor market, with special emphasis on the participation of women in ICT sector.

ICT becomes a growing sector, crucial for employment and economic development at the national and international level. Although the employment growth is evident, however, there is no simultaneous increase in the number of job positions for both men and women in ICT labor market. With general increase in employment opportunities, the employment of women in developed countries has been declining, which indicates that there are problems with lack of motivation, and promotion of women's participation at all levels of work. Deficit of trained women who are professionals in their jobs (women count less than 20% of experts in ICT sector) in OECD countries is becoming a problem that needs to be faced and permanently worked on. Developed EU countries foresee an alarming fact that in the next ten years there will be 900 000 more job positions than the corresponding ICT professionals²⁵

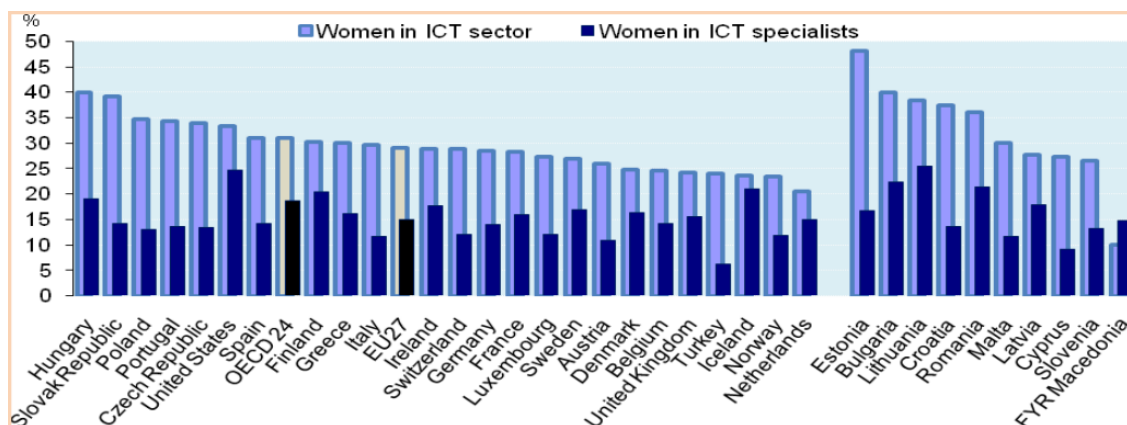
One of the main issues in ICT sector is the fact that this sector is predominantly male, because most of senior positions with high salaries are occupied by men. Researches carried out in developed countries, but also in developing countries, show that women are present only at lower positions in the ICT sector. It has been shown that only 15% of all managers and only 11% of all strategic experts are women. Right here is the scope for significant improvement in the number of women in management positions and senior management levels.

The contents of this chapter can be analyzed through four separate Subsections. The participation of women in the ICT sector has been analyzed at the level of OECD countries. The next Subsection focuses on the needs of the ICT knowledge by professional qualifications and jobs. The job positions and data related to Serbia are analyzed here. Labor market data and the most demanded job positions in Serbia are given in the last two Subsections.

6.1. The participation of women in ICT sector in Europe

The research shows that women are still significantly less involved in ICT sector as ICT professionals than men, but their share of employment is increasing in most countries. According to data from 2009, the participation of women in ICT sector is about 30% in selected countries as shown in the following graph (source: ITU). Women professionals in ICT sector represented around 18%

²⁵ A bright future in ICTs (2012) – Opportunities for a new generation of women, Report, ITU.



Žene u IKT sektoru

Žene u IKT ekspertkinje

Figure 6.1 Participation of woman in ICT sector and percentage of women specialist in ICT sector in selected countries, 2009 (source: ITU)

In Canada women are only a quarter of the employees in ICT sector (source: ITU) in 2006. It was concluded that there is a need to hire more women, but not just because of gender equality, but because women's participation is good for the job. The increased participation of women in the structure of employees leads to limited access to the skills and talents of half the population. ICT companies are aware that women are the largest buyers and users of ICT. For this reason, they need creative women to produce and open new markets and new products. But there is a certain problem with the commitment of young women to study law, medicine and other "traditional" female studies, as opposed to computer and engineering studies that are predominantly for the male population.

Next Figure 6.2 shows the share of ICT professionals by occupation, i.e. by sectors in EU (Source: ITU).

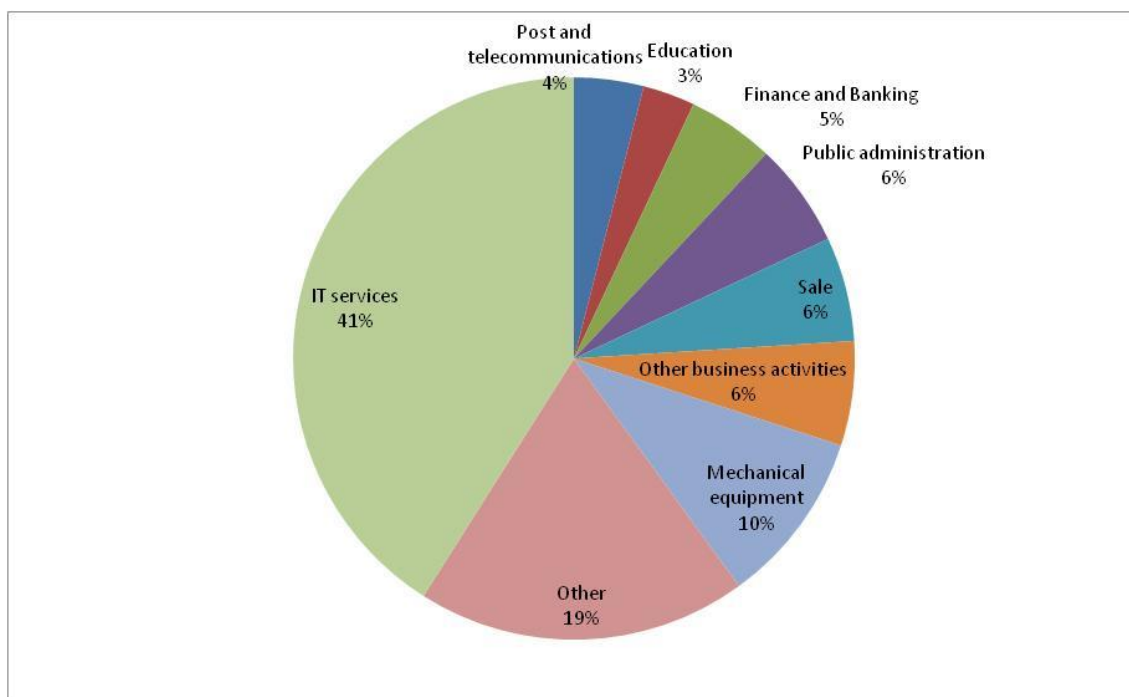


Figure 6.2 Participation of ICT professionals by sector (Source: ITU).

The situation related to the Republic of Serbia is presented in the following Subsections

6.2. 3. The needs for ICT knowledge by professional qualifications and job positions in Serbia

This Subection provides an overview of the needs of ICT knowledge related to professional qualifications and job positions in Serbia. In order to obtain the data whether there are job positions which do not require ICT knowledge, following professional qualifications were analyzed (the professional qualification of the VII-1 implies that it is necessary to possess ICT basic knowledge):

- III degree - a three-year vocational school (3 years of degree)
- IV degree - four-year profession schools (4 years for the degree)
- V degree - four-year vocational school (4 years for the degree)
- VI- 1 degree - two-year college (2 year degree)
- VI- 2 degree - a three-year high school (3 year degree)
- VI- 2 degree - three years of academic study (3 year degree)
- VII- 1 degree - four years of undergraduate studies (4 year degree)

ICT knowledge and skills are necessary due to the conditions of contemporary studies and this is a prerequisite for obtaining higher education.

The results of statistical analysis, about the needs of ICT knowledge to carry out a suitable job after getting high school degree, shows the following:

- 55% of jobs require ICT knowledge.
- 12.3% of jobs that a person can apply for after completing four years does not require ICT knowledge.
- 100% of the jobs that a person can apply for after completing three years of school does not require ICT knowledge.

6.3. Labor market data in Serbia

The relevant indicators of employment of women in Serbia are presented in this Section. According to the Statistical Office of the Republic of Serbia, in total population of Serbia there are 33.5% of employees, 8.5% of unemployed residents, 43.7% of the inactive population and 14.3% of those under the age of 15 years (Figure 6.3).

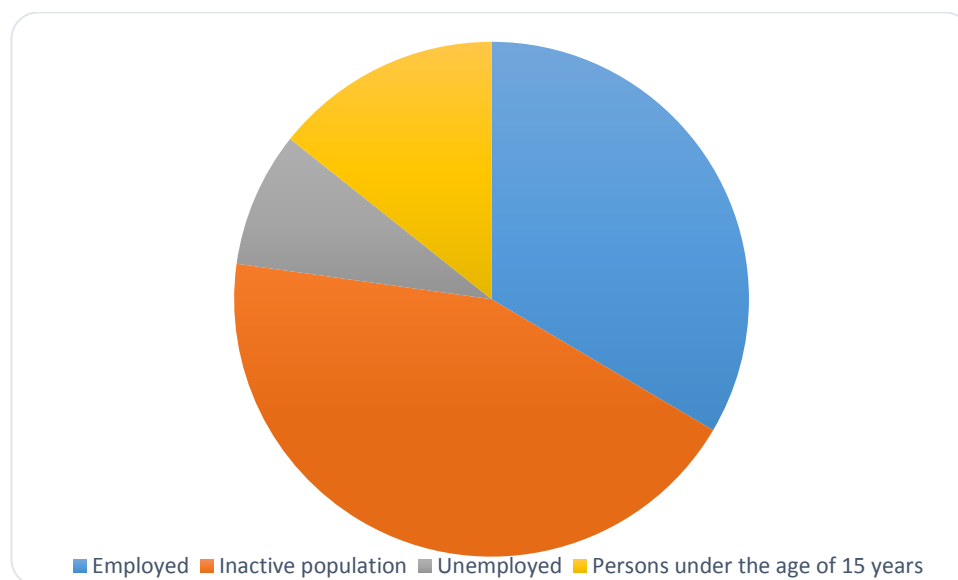


Figure 6.3 Structure of population in Serbia

The following Table 6.1 shows the structure of the population by sex and employment in Serbia

Table 6.1 The structure of total population, October 2013, Serbia

	Serbia (Total)	Sex	
		Men	Women
Total	7137605	3520986 (49.33%)	3616619(50.67%)
Population of 15 years and over	6117563	2964387 (48.46%)	3153176 (51.54%)
Active population	2997556	1699381 (56.69%)	1298176 (43.31%)
Employed	2394004	1370479 (57.25%)	1023524 (42.75%)
Unemployed	603553	328901 (54.49%)	274652 (45.51%)
Inactive population	3120007	1265006 (40.54%)	1855001 (59.46%)
Persons under the age of 15 years	1020042	556599 (54.57%)	463443 (45.43%)
Persons of working age (15-64)	4615600	2302306 (49.88%)	2313293 (50.1%)

The statistical data show that there are more women than men in total population of Serbia, but the situation is reversed when it comes to the number of employees (Figure 6.4).

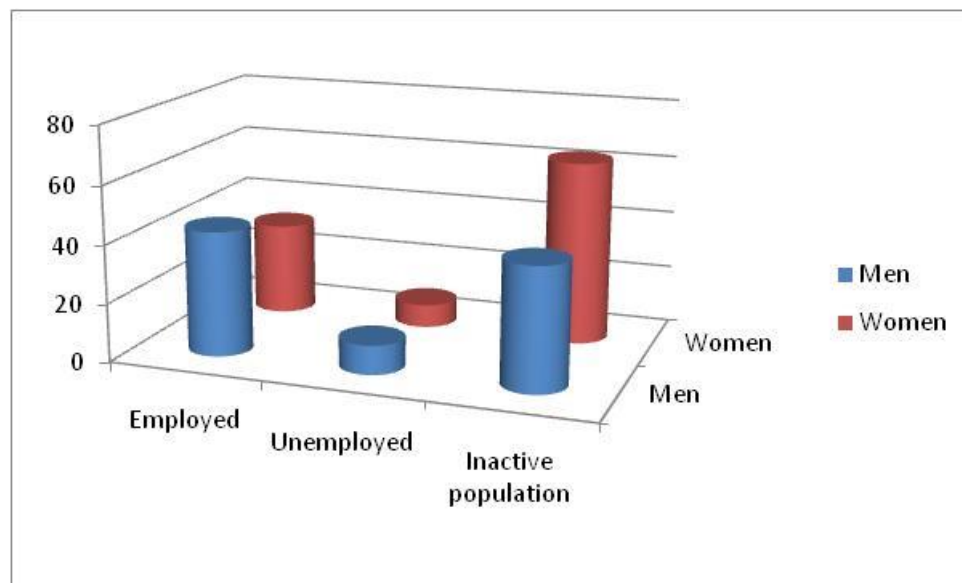


Figure 6.4 The structure of the population aged 15 years and over, by activity and gender, October 2013, Serbia

The following Table 6.2 presents the data which show that there is less women in parliament, less women officials and executives in comparison to men. Also, women are a minority in apprenticeship, as well as in agriculture and fishing and as machine operators and assemblers. All other statistically classified occupations recorded a higher proportion of women than men. Particularly prominent is the pervasive presence of female professionals. This fact can be explained by the higher participation of women in the total number of graduates from universities and colleges in Serbia.

Table6.2 Employed persons by occupation, October 2013.

	Sex		
	Serbia (Total)	Men	Women
Total	2394004	1370479 (57.25%)	1023524 (42.75%)
Legislators, senior officials and managers	87554	58188 (66.46%)	29366 (33.54%)
Experts	303619	123169 (40.57%)	180451 (59.43%)
Technicians and associate professionals	289499	140711 (48.61%)	148787 (51.39%)
Officials	160273	66945 (41.77%)	93328 (58.23%)
Service workers and traders	358786	167036 (46.55%)	191750 (53.45%)
Skilled agricultural and fishery	474874	281042 (59.18%)	193831 (40.82%)
Craft and related trades workers	298241	250240 (83.91%)	48001 (16.09%)
Plant and machine operators and assemblers	187182	162693 (86.92%)	24489 (13.08%)
Basic occupations	219312	106038 (48.35%)	113275 (51.65%)
Military	14663	14417 (98.32%)	246 (1.68%)

According to a survey conducted by the joint UN program "Promotion of Youth Employment and Management of Migration" in Serbia, the following data on the required skills are obtained, as well as data about those skills that are most difficult to find for certain job positions (Figure 6.5).

When it comes to the most wanted skills when employers hire new worker, more than 40% of them cited the flexibility and adaptability, and on third position is the knowledge of ICT. The fact that literacy and numeracy are in the last position, shows that these skills new workers have already had.

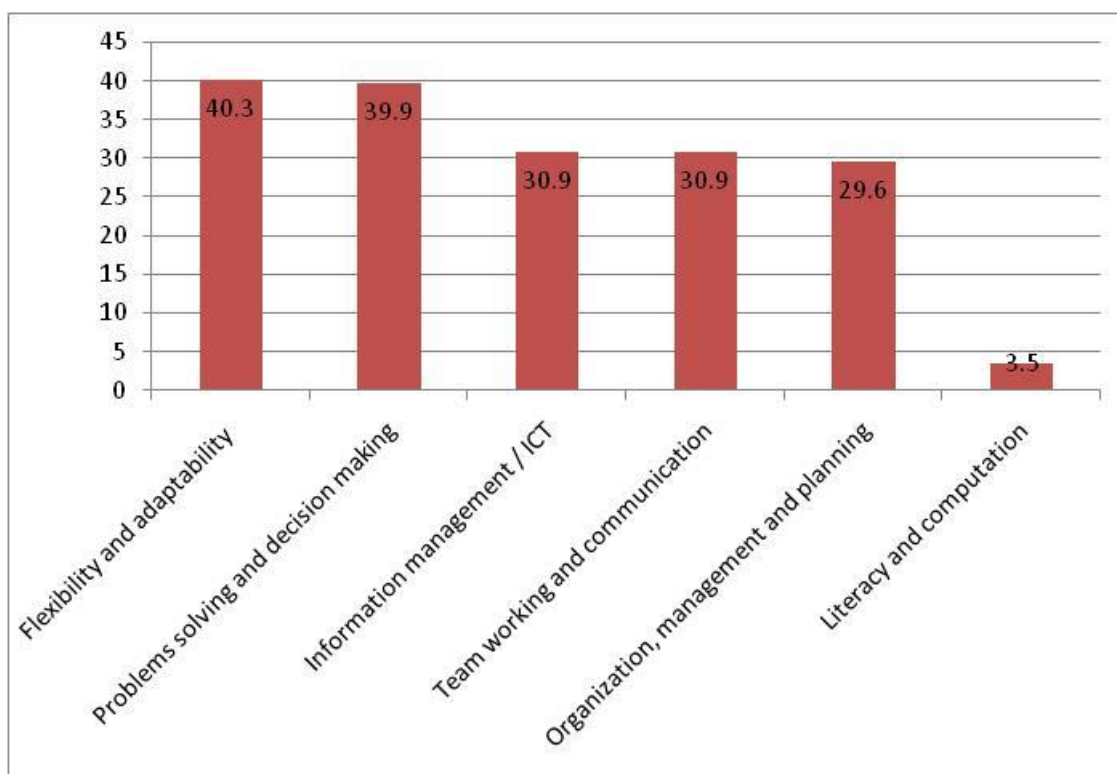


Figure 6.5 Most wanted skills for employment (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

In the opinion of nearly a third of employers, the ability to manage information, including ICT knowledge, are the skills which are the most difficult for candidates, followed by problem-solving skills and decision-making (Figure 6.6).

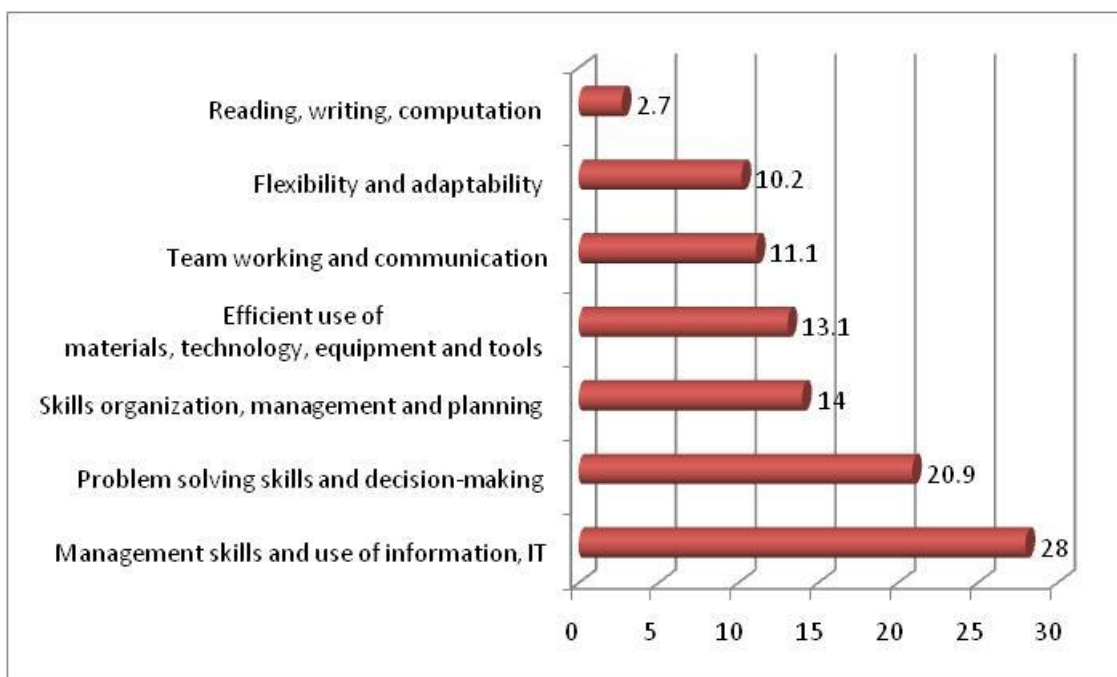


Figure 6.6 Scarce skills (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

In terms of sectors, including production, construction, education and health care, lack of ICT skills is also expressed, particularly in the health care and production sectors (Figures 6.7-6.10).

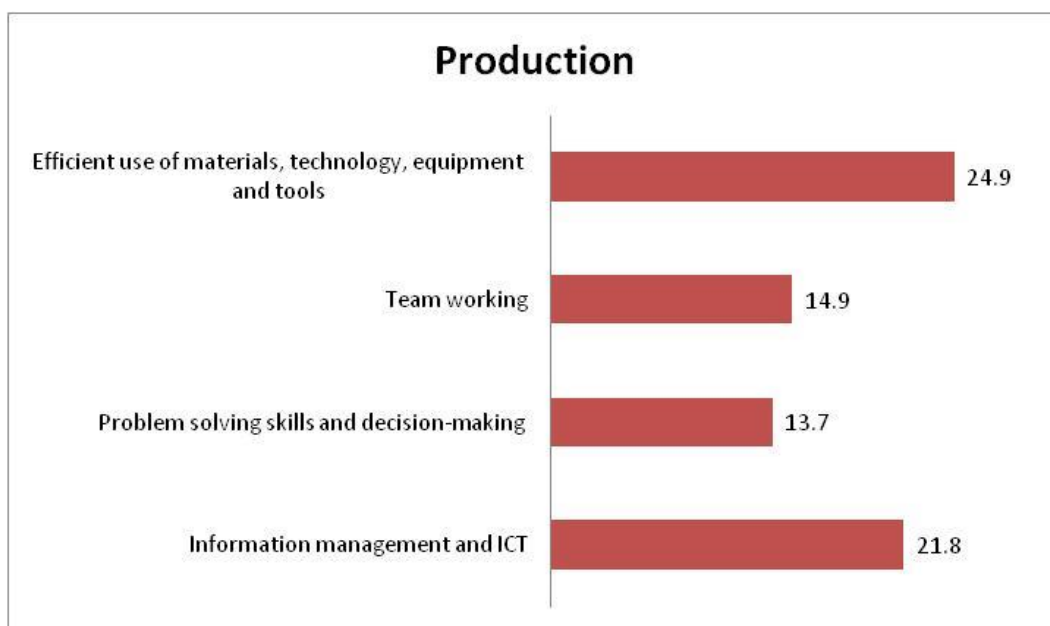


Figure 6.7 Scarce skills in the sector of production (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

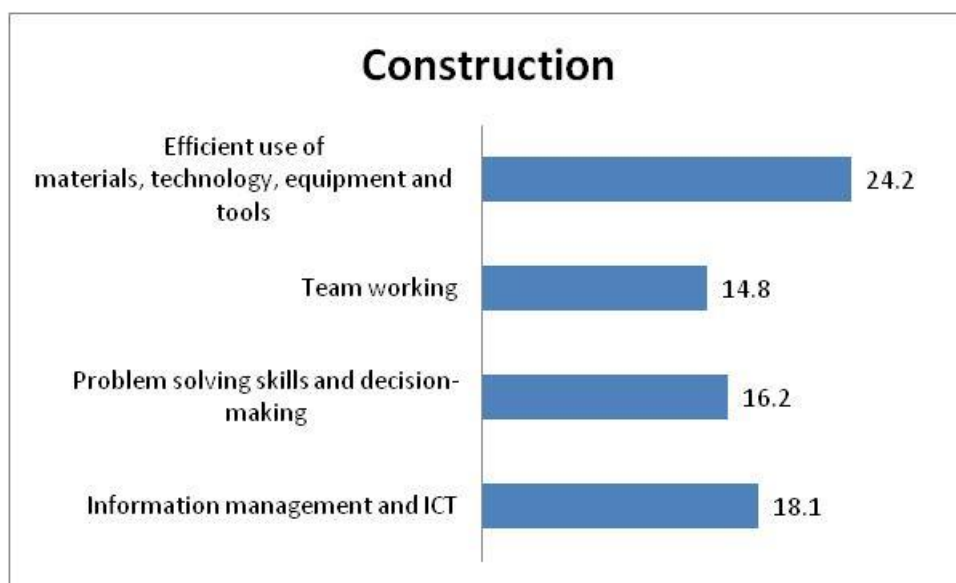


Figure 6.8 Scarce skills in the construction sector (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

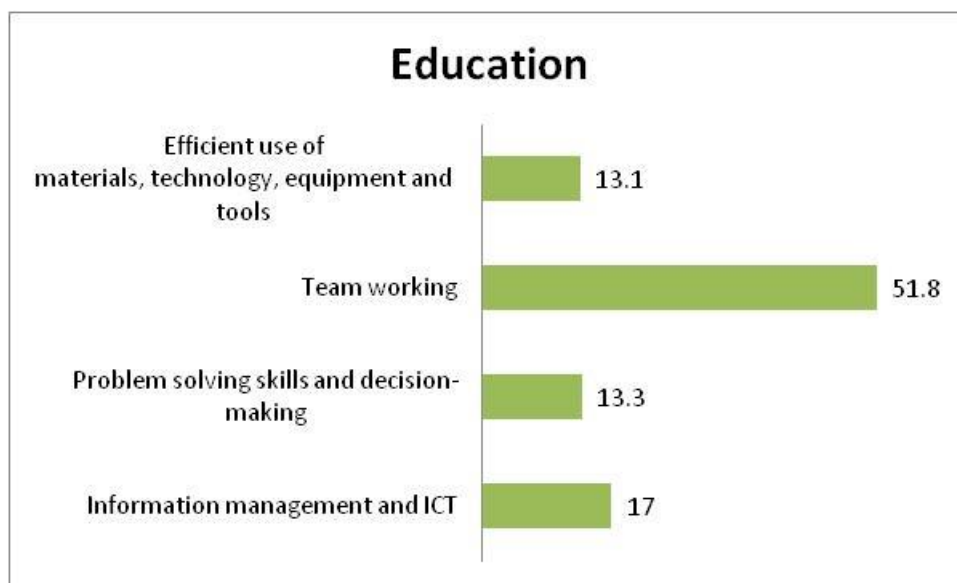


Figure 6.9 Scarce skills in the sector of education (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

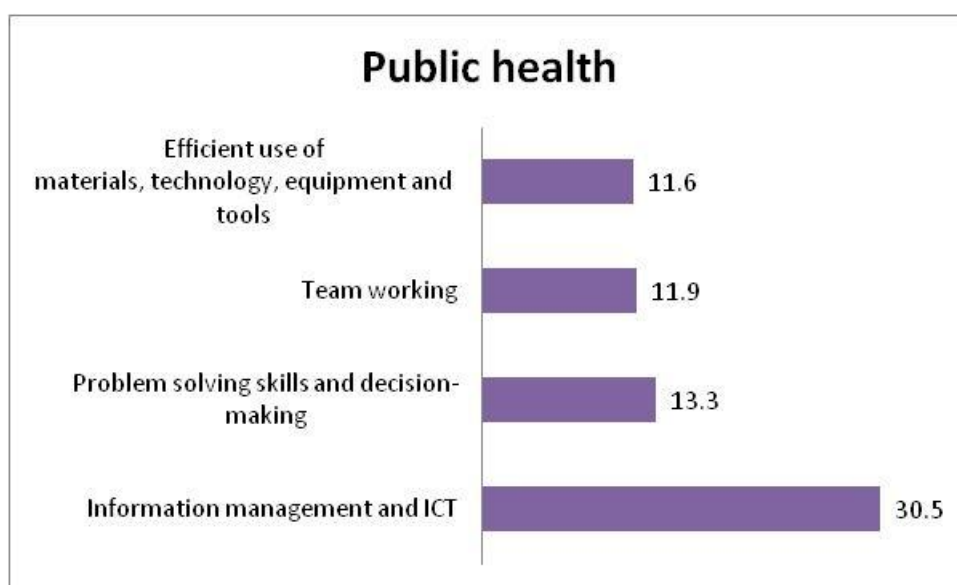


Figure 6.10 Scarce skills in the health care sector (Source: Statistical Office of the Republic of Serbia, A survey on business skills of employees, 2009)

6.4. 5. Most wanted jobs in Serbia

Based on number of published job ads on the website www.infostud.com, between 1st January to 31st December 2012, within the 40 existing categories of jobs, the structure of the most wanted categories and job positions (Figure 6.11) is as follows

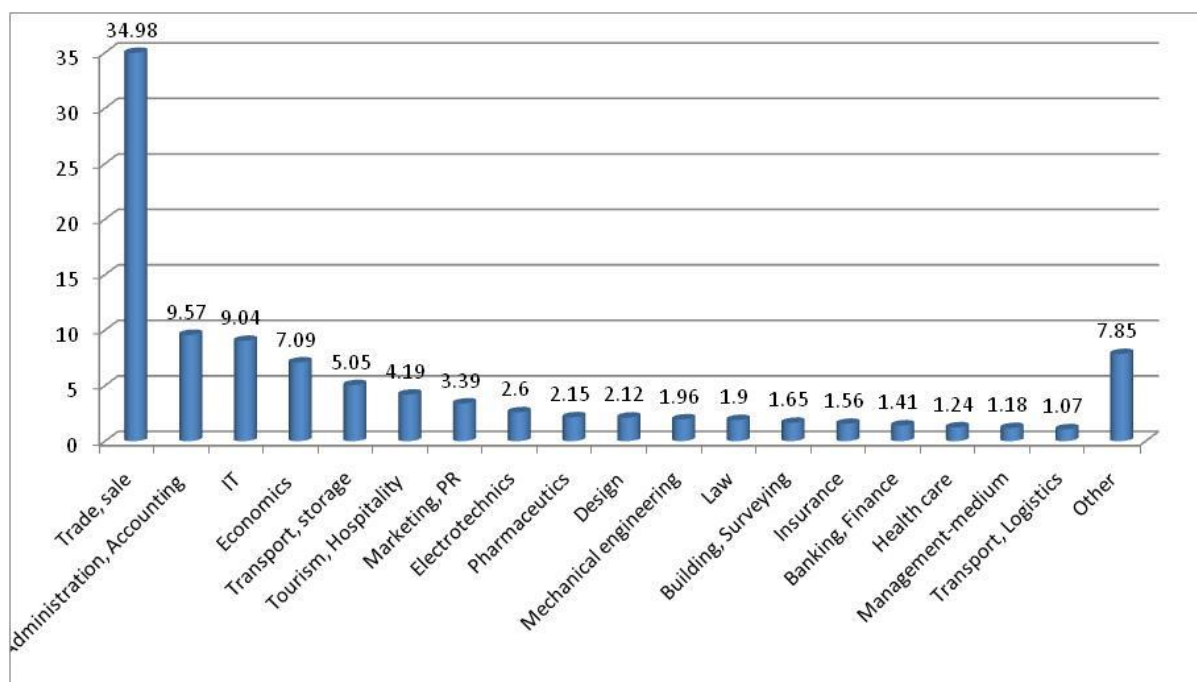


Figure 6.11 Most wanted jobs in Serbia, 2012

In 2012, not counting employees military and police employees, the average number of employed persons in Serbia is 1 727 138, which is for 19 090 less than in 2011. Decreasing number of employees can be explained by the fact that number of entrepreneurs in Belgrade is reduced by 17 601. Number of employed men is decreased by 15 394 (from 945 449 to 930 055 persons), and employed women by 3 696 (from 800 689 to 796 993 persons). At the same time the number of men is decreased in legal and entrepreneurial sector, while the number of women in the legal sector is increasing, but in entrepreneurial sector is reduced.

The Statistical Office of the Republic of Serbia published the research about the ICT usage in enterprises in 2013. The survey was conducted on a representative sample of 1 200 companies in the Republic of Serbia. The response rate was 92.7 % (1 112 enterprises). The results show that 100 % of the enterprises in the Republic of Serbia used computers in their business, which indicates an increase of 1.3 % compared to the 2012.

Analysis of the most wanted jobs in Serbia was conducted by weekly magazine "Vreme". The main criterion in the research was the level of wages. The data from the Statistical Office of the Republic of Serbia were crossed with other criteria based on which jobs are evaluated: accountability, required qualifications, the possibility of career advancement, benefits of a workplace, leisure time, the ability to make important business decisions and risks.

Based on these criteria, the best jobs in Serbia were defined: Member of parliament, IT consultant, director of a public company or a director in a public company, PR Manager and Human Resources Manager.

Member of parliament is in the list of the most wanted jobs, partly because of higher wages, and, therefore, general opinion is that this position is very easy going. Benefits that MPs have also constituted one of the reasons that this occupation is highly ranked. The work of MPs is "men's work" in Serbia, which currently holds 250 members, including 33 % of women. Among them there are plenty of lawyers, economists, doctors, and teachers, but also ordinary people.

Another profession that is seen as a very popular in Serbia is a PR manager. The main role of PR manager is to represent the company, creating its image, making good relations with environment and informing public about company's activities through the media. This position requires a college education and a high level of foreign language knowledge. Job of PR also requires a good knowledge of basic marketing, communication, and psychology of communications, media, social psychology, sociology, public opinion research, business etiquette, protocol, culture, dress, design and many other disciplines. Literacy and general culture are inevitable. Someone becomes a PR manager usually after the completion of the Faculty of Philology and Journalism.

The director of a public company is a business that ranks very high on the list of most wanted professions. The main reason for this is very high incomes. Although compared to executive positions in successful domestic and foreign companies this salary is not so high, but this position comes with a number of privileges, and because of that it should be included on the list of the best jobs in Serbia. In Serbia, this job is almost reserved for men.

Good job today, according to the survey made by "Vreme", is the human resources manager (Human Resource, HR). This job involves managing people, both individuals or teams contributing to achievement of business objectives of a company. HR manager connects teams and people, makes this process faster and easier. Therefore, the management of human resources may have crucial importance for the development of organizations and companies. In Serbia, there is a growing awareness of the importance of planning of human resources, so HR manager is currently one of the most popular professions, and also well paid with a monthly salary of around 95 000 dinars. HR managers are experts in basic business, psychology, labor and employment regulations, health insurance and health care, social protection and safety of the work. They must know the laws and regulations, internal regulations of companies or organizations in which they work (statutes, regulations, contracts, collective agreements). This job is usually performed by psychologists, lawyers, economists, educators and other experts graduated in social sciences.

IT consultant is definitely a profession that is very popular in Serbia and in the world. Responsibilities of IT consultants are very broad – he/she must have a very good knowledge of the information technology, he/she must have the theoretical knowledge and practical experience, which he/she can appropriately apply in a particular situation or share it with people he/she works with. To get such job it is often needed to have a formal education from technical college, a particular specialist examination and a solid knowledge of the information technologies that are being implemented. IT consultants may have benefits that depend on the company they work: from wages over certain bonuses and incentives, good working equipment, and telephone, transportation and travel costs covered. IT consultants are mostly men in Serbia.

6.5. Conclusion

The analysis of job positions and requirement about ICT knowledge, i.e. the current state of the labor market in the Republic of Serbia is presented in this chapter. The initial objectives are: to define the current situation in the labor market, with special emphasis on participation of women in ICT sector, as well as identification of future trends in the labor market in Serbia. In this regard, the following can be concluded. ICT is developing very fast, which has an influence on opening up new opportunities in the labor market. On the other hand, the data show that women are less than 20 % of professionals in the ICT sector. These data show the importance of women training and expanding their ICT knowledge, the promotion of ICT, as well as women motivating to be professionally engaged in ICT.

The information that women are only 15 % of managers and only 11 % of strategic experts, suggests a new employment opportunities for women in decision-making positions and senior management levels. Accordingly, it would be necessary to form a recommendation to encourage the employment of women in decision-making positions. We must point out the pervasive presence of female professionals in Serbia. This fact can be explained by the higher participation of women in the total number of graduates from universities and colleges in Serbia.

A list of the most wanted job positions in Serbia is presented in this chapter. The greatest demands for relevant staff are in the trade and sales sectors. The analysis of the most wanted job wqas conduted by crosstabulating several criteria such as: salary, responsibility, required qualifications, the possibility of career advancement, benefits that accompany workplace, leisure, the ability to make important decisions for the business and the risks that accompany it. According to this analysis, the best job positions in Serbia are: Member of Parliament, IT consultant, director of a public company, PR Manager and Human Resources Manager.

7. ANALYSIS OF WOMEN AND MEN WHO GRADUATED FROM ENGINEERING SCIENCES

The issue of women's underrepresentation in sciences and engineering fields, whether in school, higher education, or industry, has been studied in many ways over several decades. Disparity between women and men has persisted in the requirement and retention of women at all levels, particularly in the highest corporate and academic positions. Engineering is still established as traditionally male dominated profession and employers prefer male engineers. Women face different challenges and barriers in this "male" field.

Different theories and empirical studies concentrate on the question why there is a lack of women within the IT profession. The different ways in which children are raised and the problems resulting from working in primary male environment can influence a girl not to pursue an interest in technology. Moreover, the existence of different expectations for men and women based on culture is highlighted. Bearing in mind the words of eminent computer scientists, Professor Dame Wendy Hall, "girls still perceive computing to be "for geeks" and that this has proved to be "cultural" obstacle²⁶, so far impossible to overcome", we can conclude that cultural stereotypes of gender skills, abilities and competences are well-established in academic and corporate world.

Gender equality in terms of participation in education has not been achieved in the Republic of Serbia, according to the latest statistics. Young women are more likely than men to choose social sciences and humanities, health, pharmacy as field of study at undergraduate level. Women are underrepresented in the fields of technology, sciences and engineering. However, the share of women in traditionally male dominated professions is increased in the last decade.

The situation is very similar in Serbia. This chapter presents the analysis of women's participation in the number of graduates in engineering. The period considered for this research was the last decade. The related statistical data are obtained from Ministry of Education, Science and Technological Development of Republic of Serbia and Statistical Office of the Republic of Serbia, as well as from the Offices of Undergraduate Studies of technical faculties in Serbia.

7.1. General data on engineers in Serbia

Higher education activities in Serbia are carried out through either academic or professional career studies. Academic studies qualify students to develop and apply scientific, technical and artistic achievements, and the professional studies are more oriented towards applying practical knowledge and skills needed for entry into the labor. Accreditation process comprises accreditation of all higher education institutions and of their study programs.

Types of educational institution in Serbia include the following:

²⁶ Shepherd Jessica (2012). 'Geek' perception of computer science putting off girls, expert warns

- University- teaching and research higher education institution, to provide all three cycles of higher education.
- Faculties- usually have the status of a legal body, but also a constituent part of a university.
- Academy of applied sciences
- Colleges of academic studies
- Colleges of applied sciences

The three-cycle structure has been instituted in all university higher education institutions. Types and levels of studies are shown in Figure 7.1.

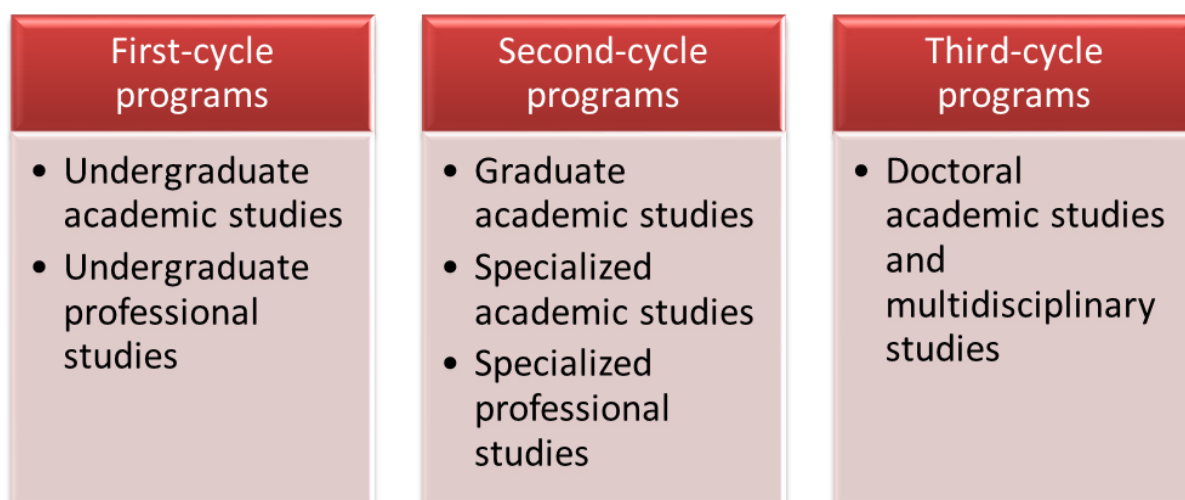


Figure 7.1 Types and levels of studies in higher education system of Serbia

According to the database of the Ministry of Education and Science and the database of CAQA there are 8 recognized public universities with 89 faculties. In addition to this, 8 private universities with 29 faculties got their accreditations in accreditation process in 2011 year.

7.1.1. Higher education 2010/2011 and 2011/2012 school years

The number of students enrolled in study programs at the faculties and colleges of academic studies in Serbia is 231 661 in school year 2011/2012. Females' share of total enrolment is 55.78%. In higher education 8,669 teachers and 4,663 associates were employed full time. The number of students has increased by 1.35% over the last year, Table 7.1.

Table 7.1 The number of students pursuing higher-education degrees

School year	Faculties and colleges of academic studies	Enrolled		Teachers		Associates	
		Total number	Female students	Total number	Employed full time	Total number	Employed full time
2010/2011	189	228 531	127 154	9 467	8 306	5 388	4 869
2011/2012	188	231 661	129 220	9 808	8 669	5 222	4 663

7.1.2. Student enrollment in natural science and engineering fields

A total of 58 661 natural science and engineering students enrolled at higher education institutions in Serbia in school year 2011/2012, comprising over 25 percent of total enrollment. Engineering institutions report slightly growth in the number of students pursuing an engineering education compared to the previous year. Lower enrollment and interest in natural science and engineering fields are observed in school years 2009/2010 and 2010/2011.

Table 7.2 The number of students enrolled in of natural science and engineering

STUDENT ENROLLMENT			
School year	NATURAL SCIENCE, MATHEMATICS AND INFORMATICS	TECHNICAL SCIENCE, MANUFACTURING AND CONSTRUCTION	TOTAL ENROLLMENT (NATURAL SCIENCE AND ENGINEERING)
2008/2009	22 648 (40.41%)	33 397 (59.59%)	56 045
2009/2010	20 885 (39.29%)	32 272 (60.71%)	53 157
2010/2011	22 599 (40.99%)	32 528 (59.01%)	55 127
2011/2012	23 788 (40.55%)	34 873 (59.45%)	58 661

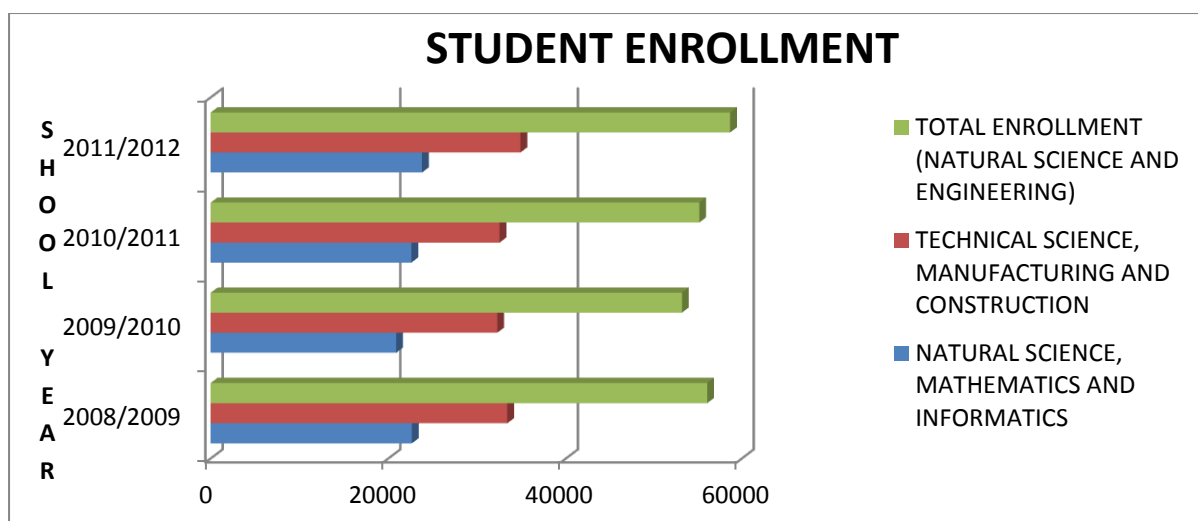


Figure 7.2 The number of students enrolled in of natural science and engineering

7.1.3. Graduate students (natural science and engineering fields)

During the period from 2008 to 2011, growth in degrees awarded in natural science and engineering fields has been rising. Degrees awarded to student engineers comprised for about 24 percent of the total in 2011, Table 7.3 and Figure 7.3.

By analyzing the collected data, Table 7.4 and Figure 7.4, it is noticed the substantial growth in number of graduate engineers in 2010. In 2011, the share of graduate engineers in total number is considerably dropped from the previous year. These results may be due to integration of Bologna Process principles into education system in Serbia. It can't be concluded that the positive growth trend continues due the lack of relevant data for following years. Graduate students (natural science and engineering fields)

Table 7.3 The number of graduate students in natural science and engineering

Year	GRADUATE STUDENTS		
	NATURAL SCIENCE, MATHEMATICS AND INFORMATICS	TECHNICAL SCIENCE, MANUFACTURING AND CONSTRUCTION	TOTAL NUMBER (NATURAL SCIENCE AND ENGINEERING)
2008	2 839	5 752	8 591
2009	3 448	6 852	10 300
2010	4 265	7 306	11 571
2011	4 059	7 725	11 784

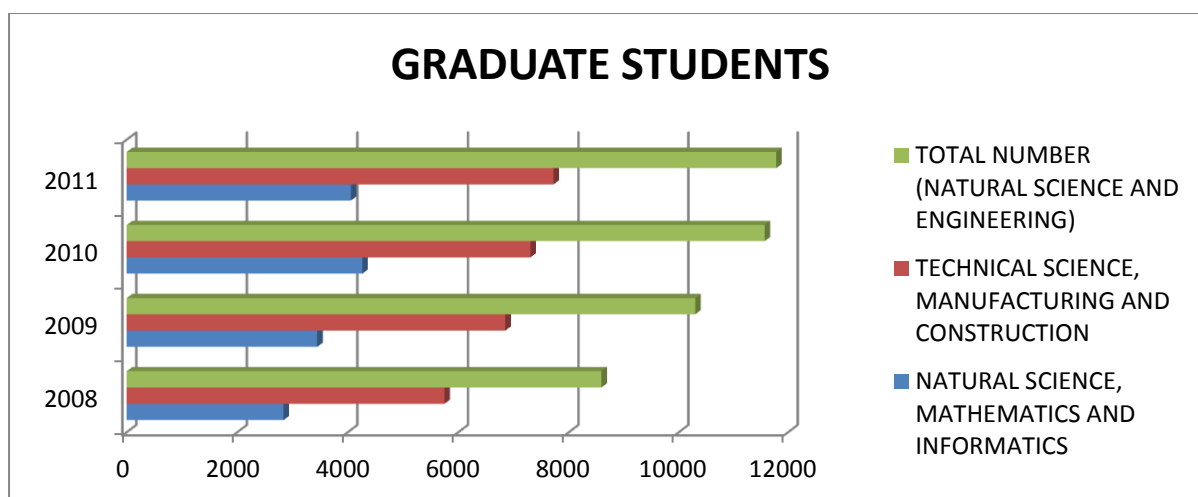


Figure7.3 The number of graduate students in natural science and engineering

Table 7.4 The share of graduate engineers (natural science and engineering field) in total number of graduate students

THE SHARE OF GRADUATE ENGINEERS (NATURAL SCIENCE AND ENGINEERING FIELD) IN TOTAL NUMBER	
YEAR	PERCENTAGE
2008	21.30
2009	23.65
2010	25.07
2011	24.80

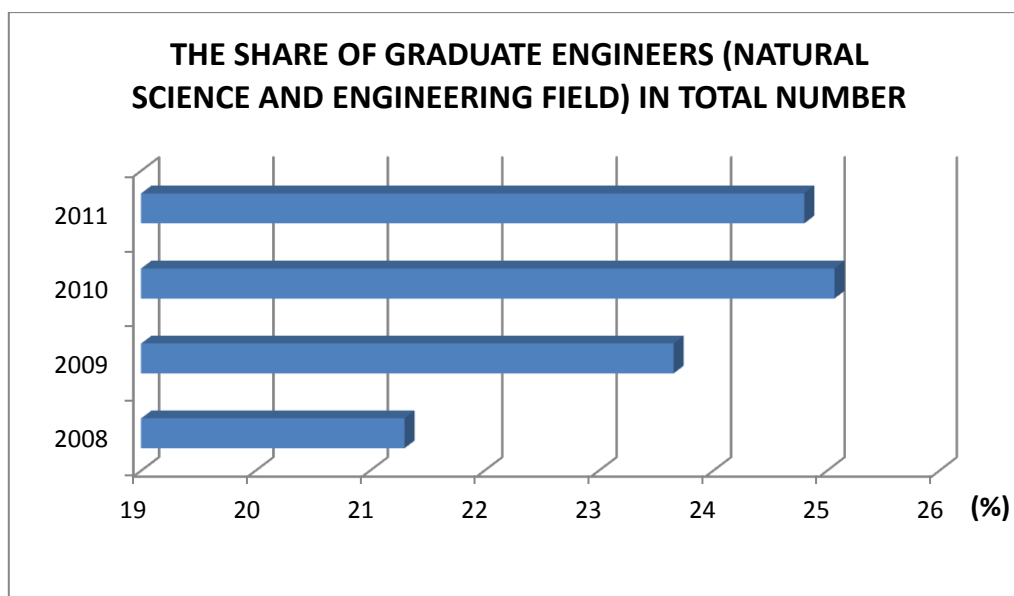


Figure 7.4 The share of graduate engineers (natural science and engineering field) in total number of graduate student

7.1.4. Number of female engineering graduates

In the years from 2009 to 2011, there were 5 199 undergraduate engineering degrees awarded to female and 7 988 graduate engineering degrees. The number of females graduated in engineering field is declining, which can be explained by steadily drop in total number of graduate engineers in 2010 and 2011. On other side, the growth is noticed in the number of females with master's degree. Females accounted for around 35 percent of undergraduate engineering degrees and slightly more than 42 percent of graduate engineering degrees. The proportion of engineering degrees awarded to females shows a decreasing trend, not just at undergraduate level but also at graduate level. Number of female engineering graduates, Table 7.5 and figure 7.5.

Table 7.5 The number of females graduated in natural science and engineering

Year	Undergraduate level			Graduate level		
	TOTAL NUMBER OF GRADUATE ENGINEERS	WOMEN	% WOMEN	TOTAL NUMBER OF GRADUATE ENGINEERS	WOMEN	% WOMEN
2009	5250	1976	37.64	5178	2322	44.84
2010	4459	1567	35.14	6564	2694	41.04
2011	5093	1656	32.51	7531	2972	39.46

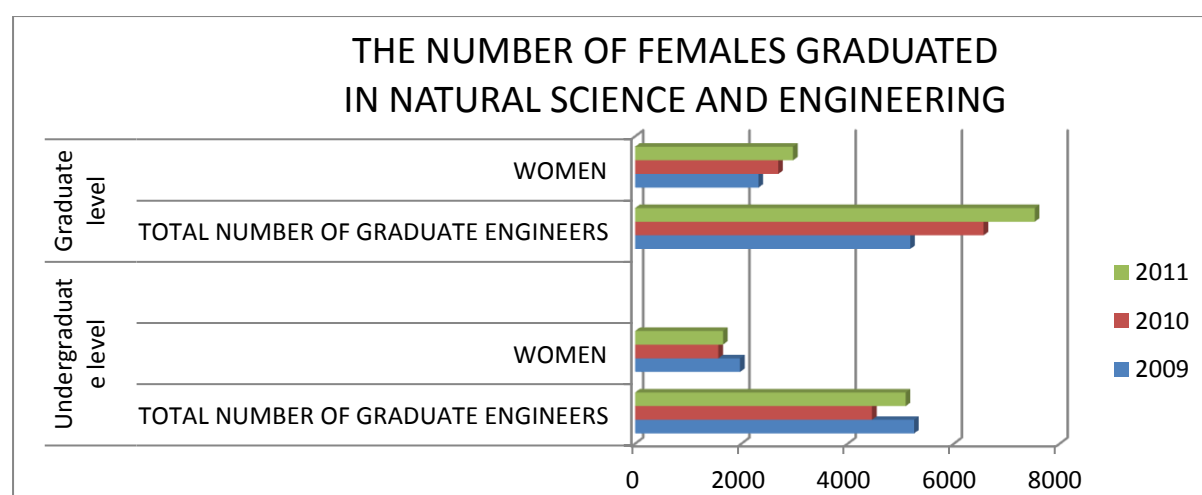


Figure 7.5 The number of females graduated in natural science and engineering

The top ten careers with the highest proportion of engineering undergraduate degrees awarded to females are shown in Table 7.6, Table 7.7 and Table 7.8. Women tend to dominate in architecture, technology, agriculture and industrial engineering (management) field.

Table7.6 The highest proportion of engineering undergraduate degrees awarded to females, 2009

2009		
GRADUATE CAREERS	NUMBER OF WOMEN	% WOMEN
Textile and design clothing engineer	19	95.00
Textile engineer in clothing technology	88	88.00
Pharmaceutical technology engineer	63	84.00
Forest engineer	40	83.33
Bachelor of science in agriculture	9	81.82
Chemical engineer	43	81.13
Professional technology engineer	269	77.52
Textile engineer	40	74.07
Water technology engineer	26	70.27
Professional geology engineer- specialist	51	66.23

Table7.7 The highest proportion of engineering undergraduate degrees awarded to females, 2010

2010		
GRADUATE CAREERS	NUMBER OF WOMEN	% WOMEN
Chemical engineer	4	100.00
Environmental protection engineer	54	73.97
Textile engineer	53	73.61
Bachelor of science in environmental protection	37	71.15
Bachelor of science in architecture	43	68.25
Professional management engineer	20	66.67
Entrepreneurship management engineer	32	64.00
Architecture engineer	167	63.98
Bachelor of science in management engineering	114	62.98
Bachelor of science in agriculture	23	56.10

Table 7.8 The highest proportion of engineering undergraduate degrees awarded to females, 2011.

2011		
GRADUATE CAREERS	NUMBER OF WOMEN	% WOMEN
Textile engineer	105	90.52
Chemical engineer	29	72.50
Technology engineer	50	71.43
Environmental protection engineer	61	64.89
Architecture engineer	191	64.75
Bachelor of science in graphic design engineering	23	60.53
Professional technology engineer	182	59.48
Professional graphic design engineer	37	58.73
Professional occupational safety engineer	4	57.14
Bachelor of science in architecture	53	55.79

By analyzing the collected data for the years 2009 to 2011, it can be concluded that women are still outnumbered by men in electrical and computer engineering, transport industry and construction industry. On the other side, men are overrepresented in architecture, textile industry and environmental protection. Graduate careers by gender representation are presented in Figure 4.2 and Figure 4.3. Key findings include a slightly growth in the numbers of women in some of the male dominated careers. The rise in the number of degrees is observed in electrical and computer engineering, as well as in computer science career in 2010. However, women's participation rate in total number of electrical and computer engineering graduates fell in 2011. Due to lack of data for the following years, it is not possible to conclude whether women's participation rate continues to decline, which requires further analytical studies of women's representation in science and engineering. Further studies should also take into account the representation of men in the so-called female dominated careers, where the rate of male graduates in engineering is in steadily decline.

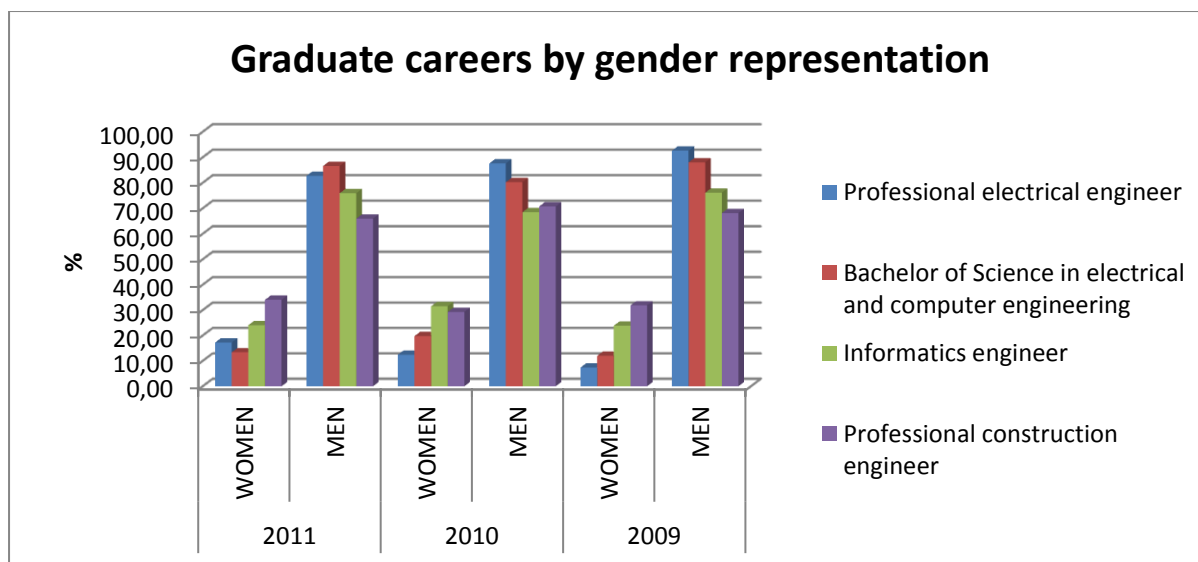


Figure 7.6 Graduate careers by gender representation - male dominated careers

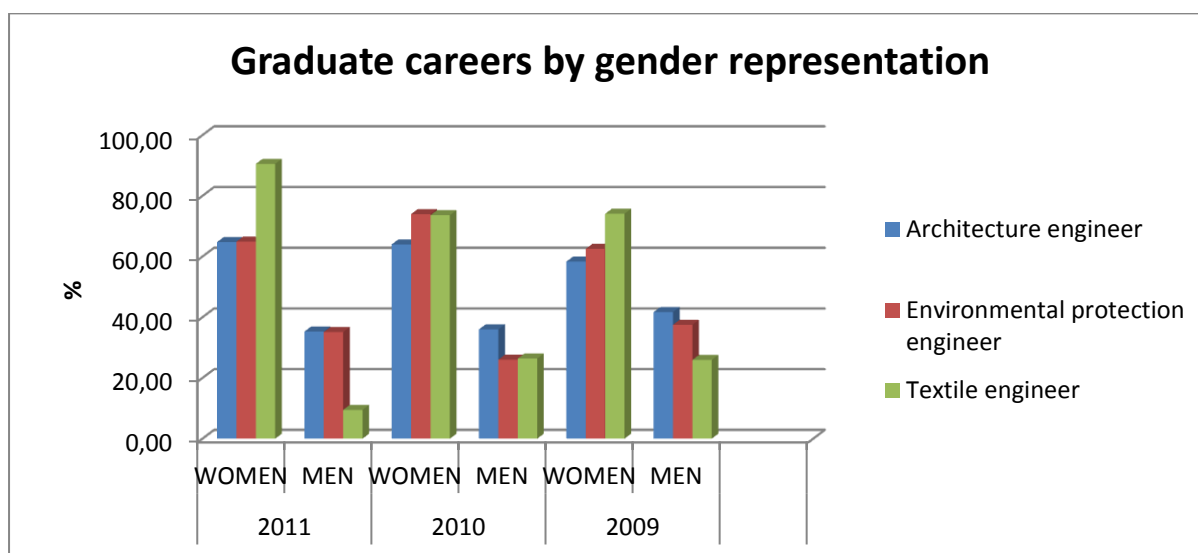


Figure 7.7 Graduate careers by gender representation – female dominated careers

7.2. A review of women's representation in the number of engineering graduates at technical faculties

A number of technical faculties was contacted for the purposes of this study. The relevant data are obtained from Offices of Undergraduate Studies of few technical faculties. Unfortunately, several faculties don't have all needed data for analysis or data are not available at all. It was concluded that some faculties do not keep accurate data regarding student gender.

7.2.1. FACULTY OF ELECTRICAL ENGINEERING, UNIVERSITY OF BELGRADE

Table 7.9 outlines the number of students enrolled in the freshman year for the period 2006-2012, while Table 7.10 presents the number of engineering graduates. Graphical representation of the tables is given in Figures 7.8 and 7.9.

Table7.9 ETF - The number of students enrolled in the freshman year

Year	ELECTRICAL ENGINEERING		SOFTWARE ENGINEERING	
	MEN	WOMEN	MEN	WOMEN
	NUMBER	NUMBER (%)	NUMBER	NUMBER (%)
2006	384	126 (24.71)	57	3 (5.00)
2007	382	122 (24.21)	51	9 (15.00)
2008	381	119 (23.80)	48	13 (21.31)
2009	383	121 (24.01)	35	13 (27.08)
2010	404	105 (20.63)	46	14 (23.33)
2011	399	116 (22.52)	43	17 (28.33)
2012	332	168 (33.60)	38	22 (36.67)

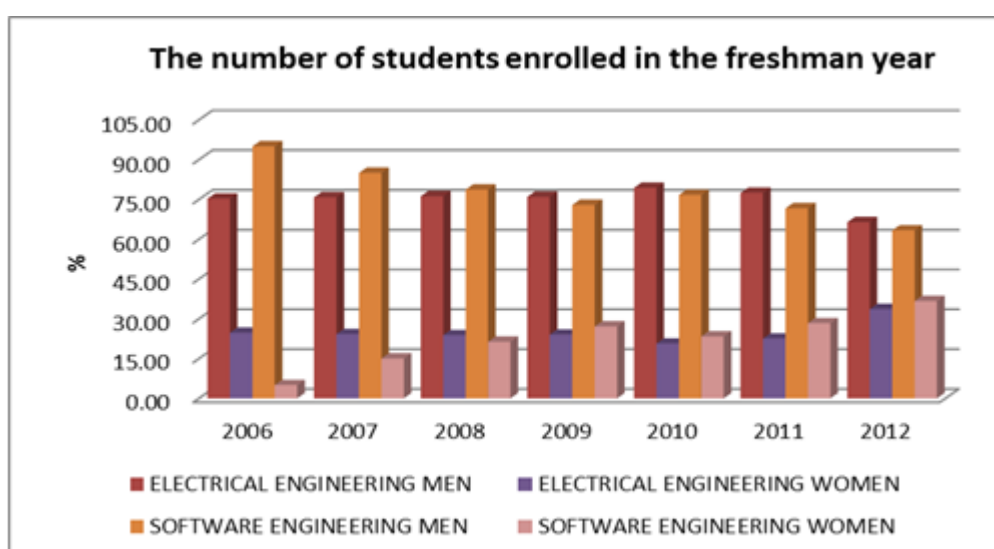


Figure 7.8 ETF - The number of students enrolled in the freshman year

Table7.10 ETF –Number of engineering graduates in years 2007- 2011

THE NUMBER OF ENGINEERING GRADUATES	
MEN	WOMEN
2807	845

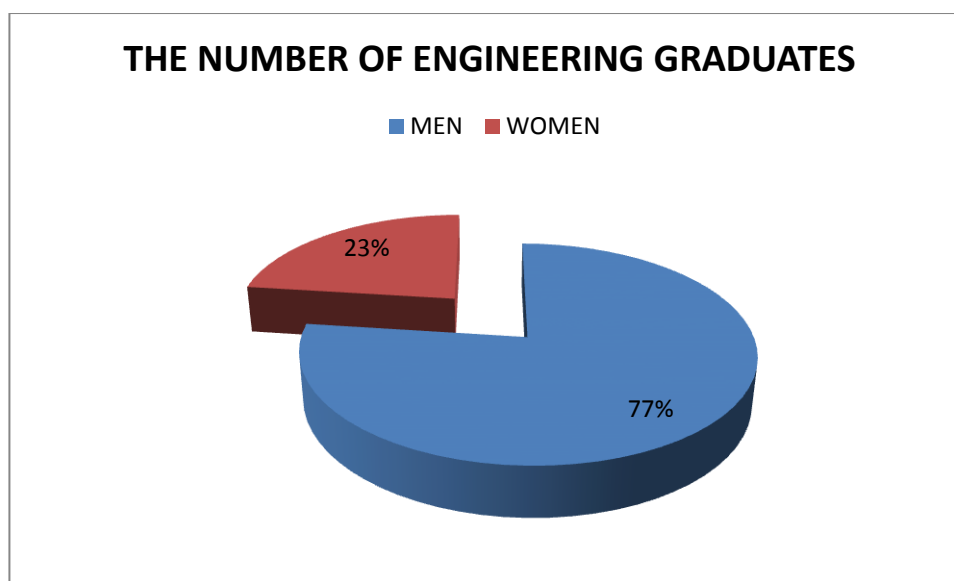


Figure 7.9 ETF - The share of engineering graduates in years 2007- 2011

At the Faculty of Electrical Engineering in Belgrade women hold a low share of engineering degrees, only 23 percent. However, it is encouraging that the number of female students pursuing an engineering education is in constant growth in the years from 2006 to 2012. The exception to this trend appears to be the lower percent of female students enrolled in engineering programs in 2010 and 2011.

7.2.2. Faculty of transport and traffic engineering, University of Belgrade

Table 7.11 gives an overview of the number of students enrolled in the freshman year at the Faculty of Transport and Traffic Engineering in Belgrade, while Table 7.12 presents the number of engineering graduates. Graphical representation of the tables is given in Figures 7.10 and 7.11.

Table 7.11 SF – Gender structure of students enrolled in the freshman year

SCHOOL YEAR	MEN	WOMEN	
	NUMBER	NUMBER	%
2007/08	231	129	35.83
2008/09	234	119	33.71
2009/10	207	143	40.86
2010/11	241	127	34.51
2011/12	230	110	32.35

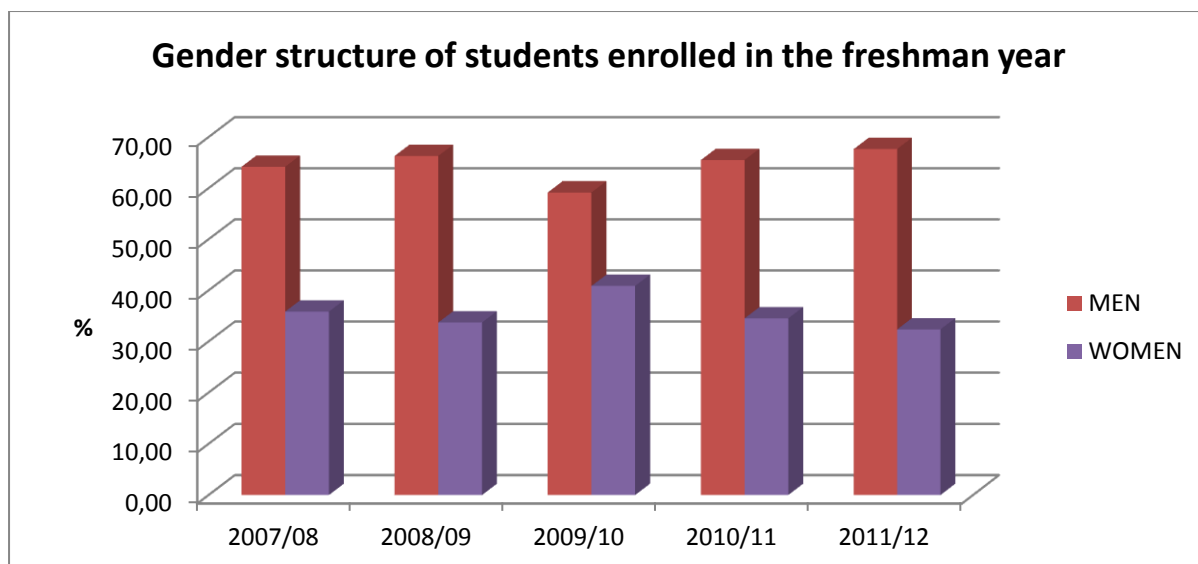


Figure 7.10 SF – Gender structure of students enrolled in the freshman year

Table 7.12 SF – The number of engineering graduates

SCHOOL YEAR	MEN	WOMEN	
	NUMBER	NUMBER	%
2007/08	146	103	41.37
2008/09	174	152	46.63
2009/10	254	203	44.42
2010/11	223	127	36.29
2011/12	148	84	36.21

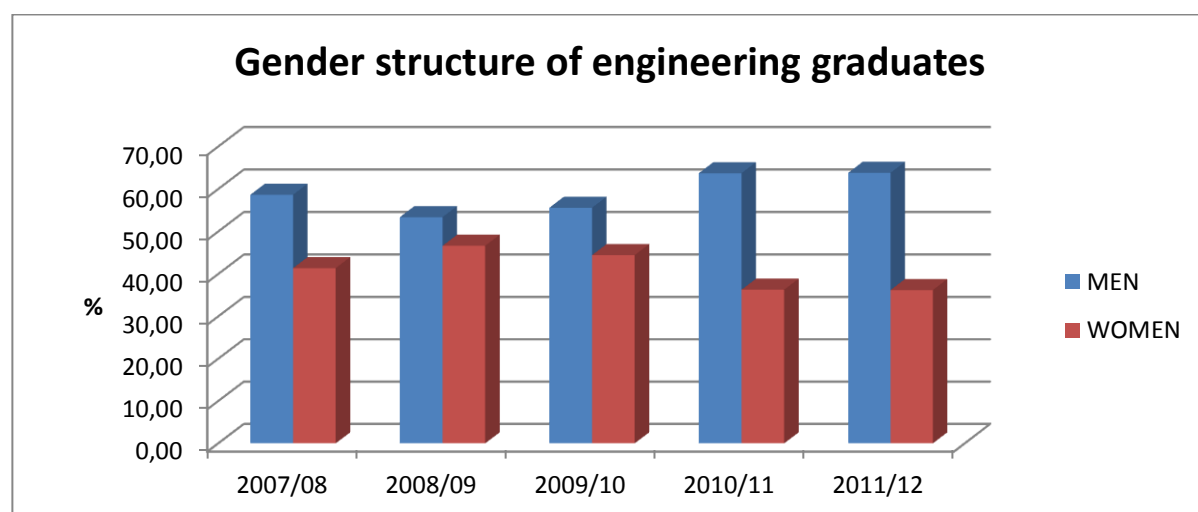


Figure 7.11 SF - Gender structure of engineering graduates

A negative temporal trend in share of female students is observed at the Faculty of Transport and Traffic Engineering in Belgrade. Not just a number of women enrolled, but also a number of female

engineering graduates decreases over the last years. One good example is the number of enrolled females which increased from 33.71 to 40.86 percent and reached the peak in school year 2009/2010. In the past two years, the number has stopped falling and females accounted for around 36 percent of engineering degrees.

7.2.3. Faculty of organizational sciences, Univerzity of Belgrade

Tables 7.13 and 7.14 give an overview of number of students enrolled and graduated in engineering fields at the Faculty of Organizational Sciences in the reporting period. Figure 7.12 illustrates the number of graduates by field and gender.

Table7.13 FON – The number of students enrolled in the freshman year

YEAR	STUDENTS ENROLLEMENT	
	INFORMATION SYSTEMS AND TECHNOLOGIES	MANAGEMENT AND ORGANIZATION
2009	260	330
2010	260	330
2011	260	330
2012	260	330

Table7.14 FON – The number of engineering graduates by gender and departments

YEAR	INFORMATION SYSTEMS AND TECHNOLOGIES		MANAGEMENT AND ORGANIZATION	
	MEN	WOMEN	MEN	WOMEN
	NUMBER	NUMBER (%)	NUMBER	NUMBER (%)
2008	7	5 (41.67)	9	15 (89.58)
2009	63	53 (45.69)	50	107 (68.15)
2010	81	78 (49.06)	72	141 (66.20)
2011	142	107 (42.97)	96	181(65.34)
2012	153	96 (38.55)	127	204 (61.63)

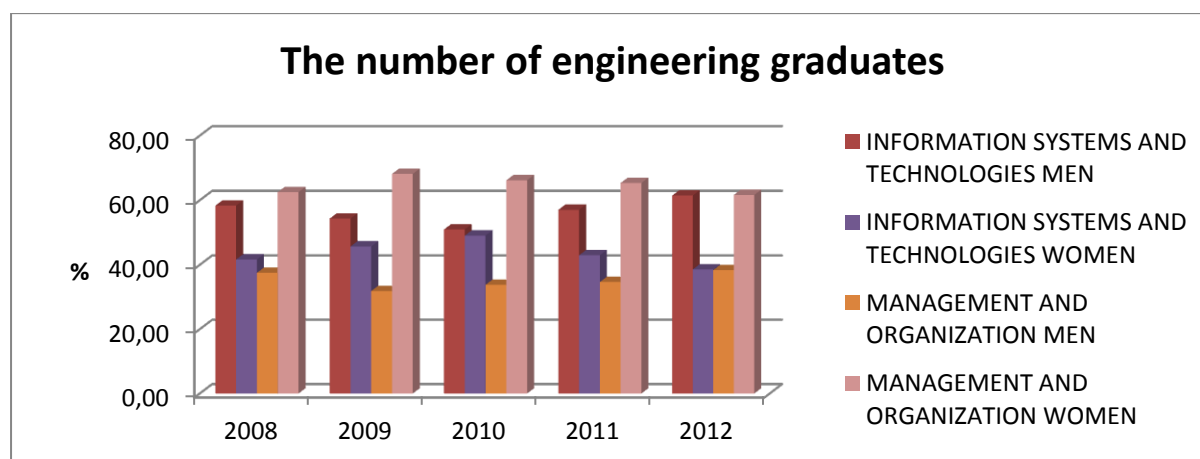


Figure 7.12 FON – The number of engineering graduates by gender and departments

A Faculty of Organizational Sciences in Belgrade deals with a similar situation. Percentage of female engineering graduates rose in information systems and technologies careers until 2010. The gender balance has been almost established and females accounted for around 49.06 percent of undergraduate engineering degrees in information systems and technologies. Afterwards, a significant drop is reported. In the absence of data for year 2013, it can't be concluded whether this negative trend continues

7.2.4. Faculty of technical sciences, University of Novi Sad

The number of students enrolled and graduated at the at the Faculty of Technical Sciences (FTN) since year 2007 is shown in Tables 7.15 and 7.16. Illustration of the tables is given in Figures 7.13 and 7.14. The number of students enrolled and graduated at the at the Faculty of Technical Sciences (FTN) since year 2007 is shown in Tables 7.15 and 7.16. Illustration of the tables is given in Figures 7.13 and 7.14.

Table 7.15 FTN – Gender structure of students enrolled in the freshman year

YEAR	ELECTRICAL AND COMPUTER ENGINEERING	
	MEN	WOMEN
	NUMBER	NUMBER (%)
2007/08	311	63 (16.84)
2008/09	264	88 (25.00)
2009/10	285	90 (24.00)
2010/11	315	112 (26.23)
2011/12	307	87 (22.08)
2012/13	335	88 (20.80)
2013/14	479	158 (24.80)

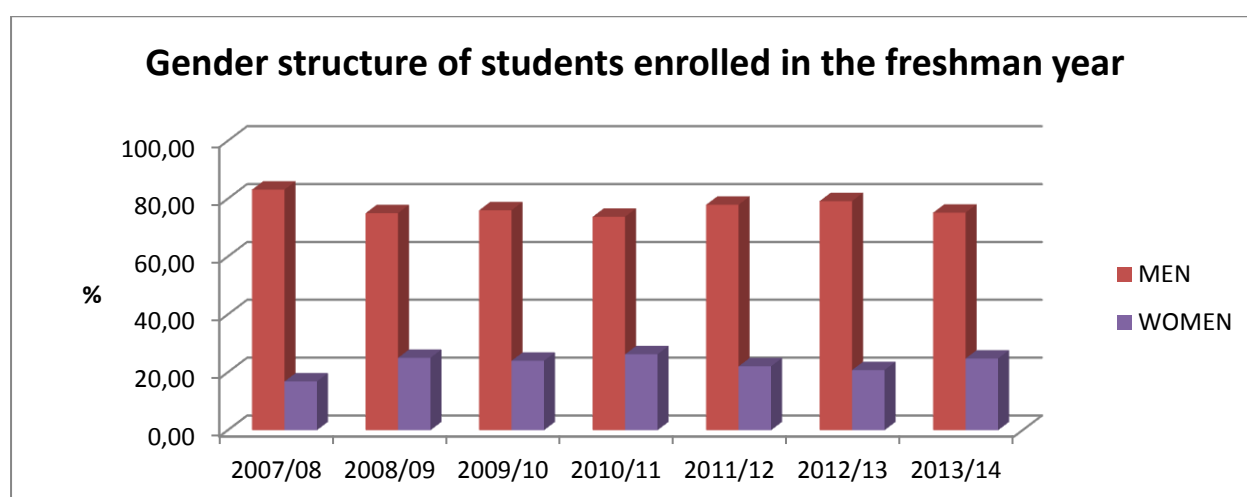


Figure 7.13 FTN – Gender structure of students enrolled in the freshman year

Table 7.15 FTN – Gender structure of engineering graduates

YEAR	ELECTRICAL AND COMPUTER ENGINEERING	
	MEN	WOMEN
	NUMBER	NUMBER (%)
2008/09	17	10 (37.04)
2009/10	151	45 (22.96)
2010/11	261	45 (14.71)
2011/12	206	31 (13.08)
2012/13	151	40 (20.94)

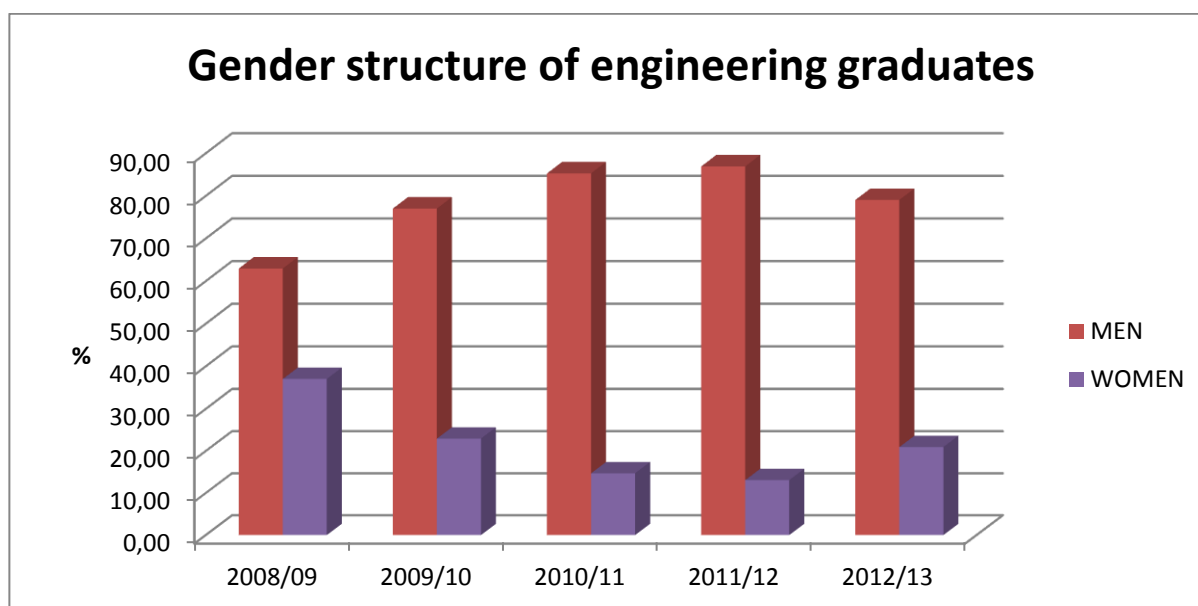


Figure 7.14 FTN – Gender structure of engineering graduates

At the Faculty of Technical Sciences in Novi Sad the enrollment of women in electrical engineering and computer science education is unstable. Higher enrollment of women is reported every school year until 2011/2012. Afterwards, female enrollment ratio decreases. The growth of share of female engineering graduates in school year 2012/2013 is encouraging. However, the share of female engineering graduates is 20.94 percent in school year 2012/2013 and is still low.

7.2.5. Tehnicalfaculty “Mihajlo Pupin” Zrenjanin, University of Novi Sad

The number of students enrolled at the department of Information Technology at the Technical Faculty "Mihajlo Pupin" is given in Table 7.17, and the illustration in Figure 7.15, while the number of graduates is given in Table 7.18 and Figure 7.16.

Table 7.17 TF MP – Gender structure of enrolled students at department of Information technologies

SCHOOL YEAR	INFORMATION TECHNOLOGIES	
	MEN	WOMEN
	NUMBER	NUMBER (%)
2009/2010	102	31 (23.31)
2010/2011	129	50 (27.93)
2011/2012	218	74 (25.34)
2012/2013	320	92 (22.33)
2013/2014	305	76 (19.95)

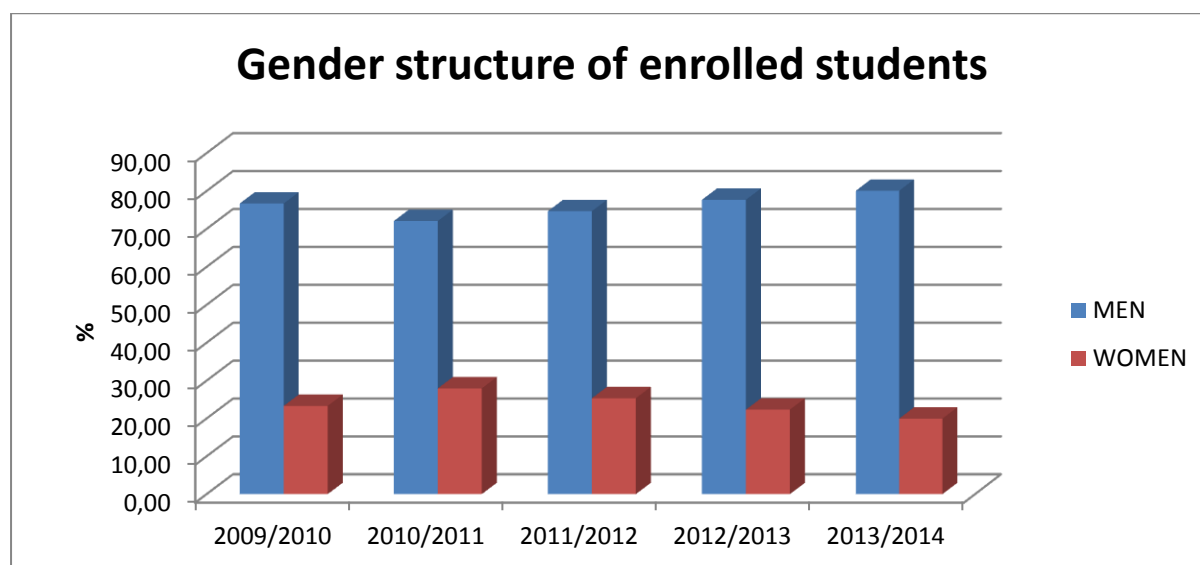


Figure 7.15TF MP – Gender structure of enrolled students at department of Information technologies

Table 7.18 TF MP - Number of engineering graduates in years 2009- 2013

THE NUMBER OF ENGINEERING GRADUATES	
MEN	WOMEN
39	41

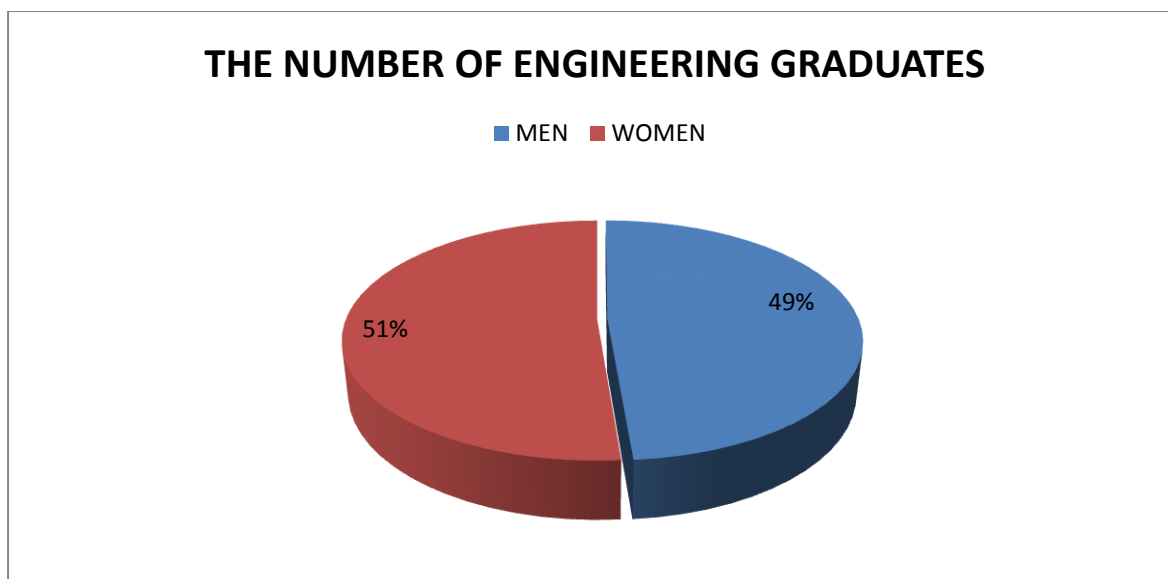


Figure 7.16 TF MP - Gender structure of engineering graduates in years 2009- 2013

The ration of female enrollment has decreased at the department of Information technologies at the Technical Faculty "Mihajlo Pupin" in Zrenjanin since 2010/2011 school year. A total of 76 female students enrolled in school year 2013/2014, comprising 19.95 percent of total enrollment. There is an emphasis on share of female engineering graduates. For the first time women have an advantage over the men in share of engineering graduates and it is 51 percent

7.2.6. Faculty of Electronici engineering, University of Nis

An overview of students enrolled and graduated at the Faculty of Electronic Engineering in Nis is shown in Table 7.19 and 7.20 and illustrated in Figure 7.17 and 7.18.

Table 7.19 EF – Gender structure of students enrolled in years 2007-2012

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	1406	150 (9.64)
2008	1392	146 (9.49)
2009	1357	128 (8.62)
2010	1432	160 (10.05)
2011	1498	187 (11.10)
2012	1477	218 (12.86)

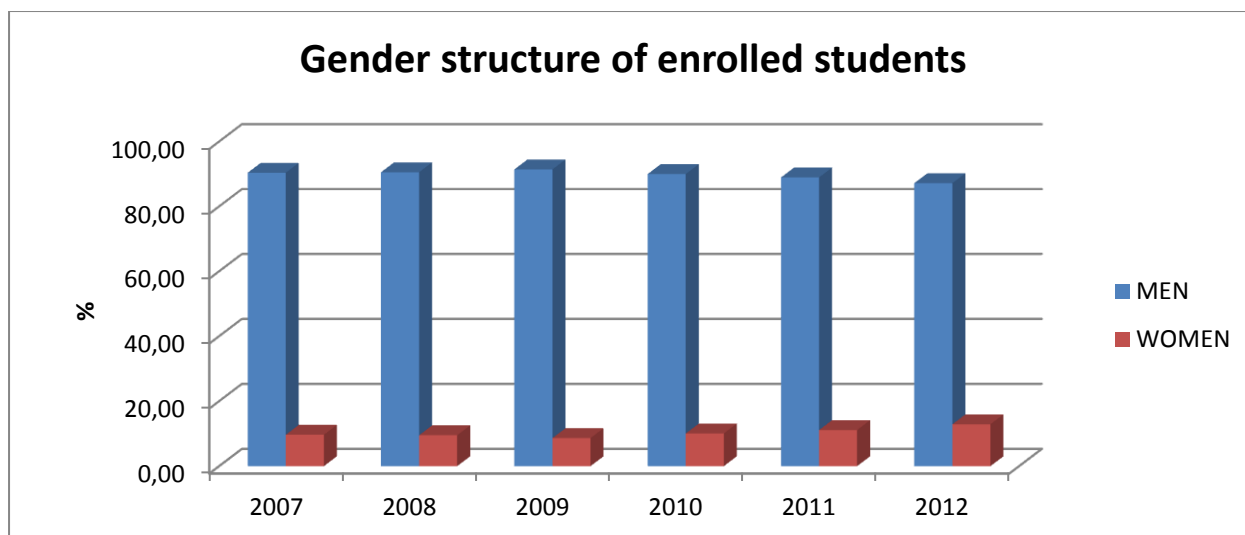


Figure 7.17 EF – Gender structure of students enrolled in years 2007-2012

Table 7.20 EF - Gender structure of engineering graduates

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	191	64 (25.10)
2008	204	44 (17.74)
2009	198	41 (17.15)
2010	178	38 (17.59)
2011	168	43 (20.38)
2012	191	52 (21.40)

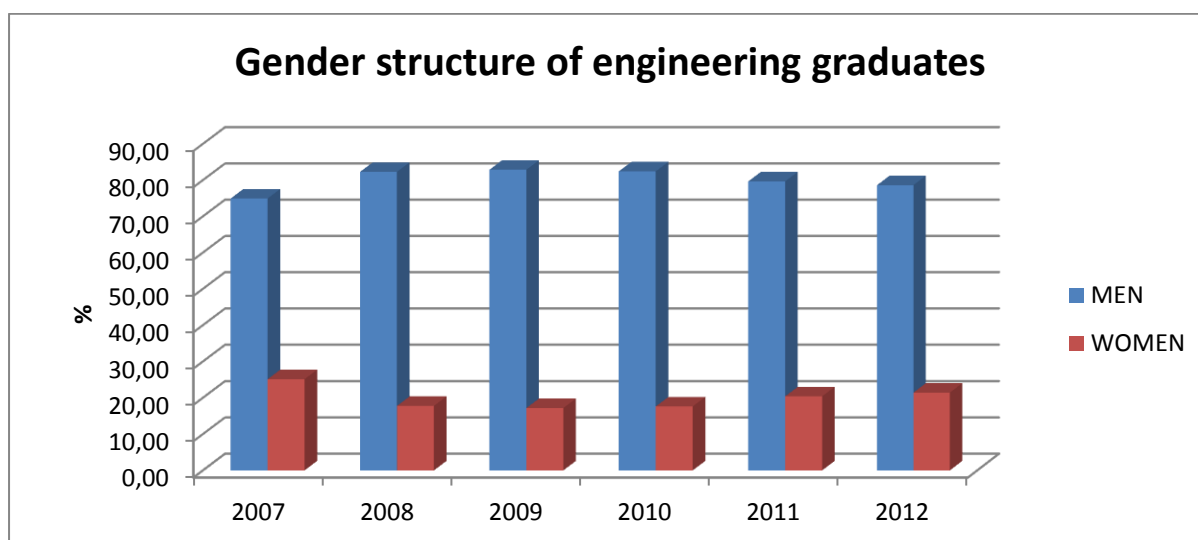


Figure 7.18 EF - Gender structure of engineering graduates

The growth in the share of women enrolled in engineering is reported at the Faculty of Electronic Engineering in Nis. In 2012, females' share of total enrolment is 12.86 percent and represents a very small percentage. The percentage of female engineering graduates hasn't varied over the years and

was about 17 percent. In the past two years, the substantial growth in share of female engineering graduates is reported.

7.2.7. Faculty of mechanical engineering, University of Nis

The Faculty of Mechanical Engineering is a traditional "male" college. Tables 7.21 and 7.22 show the number of students by gender enrolled and graduated in undergraduate degree programs for the period 2007-2012.

Table 7.21 MF UN - Gender structure of students enrolled in Undergraduate Degree Programs

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	176	46 (20.72)
2008	293	48 (14.08)
2009	154	31 (16.76)
2010	232	50 (17.73)
2011	326	76 (18.91)
2012	389	86 (18.11)

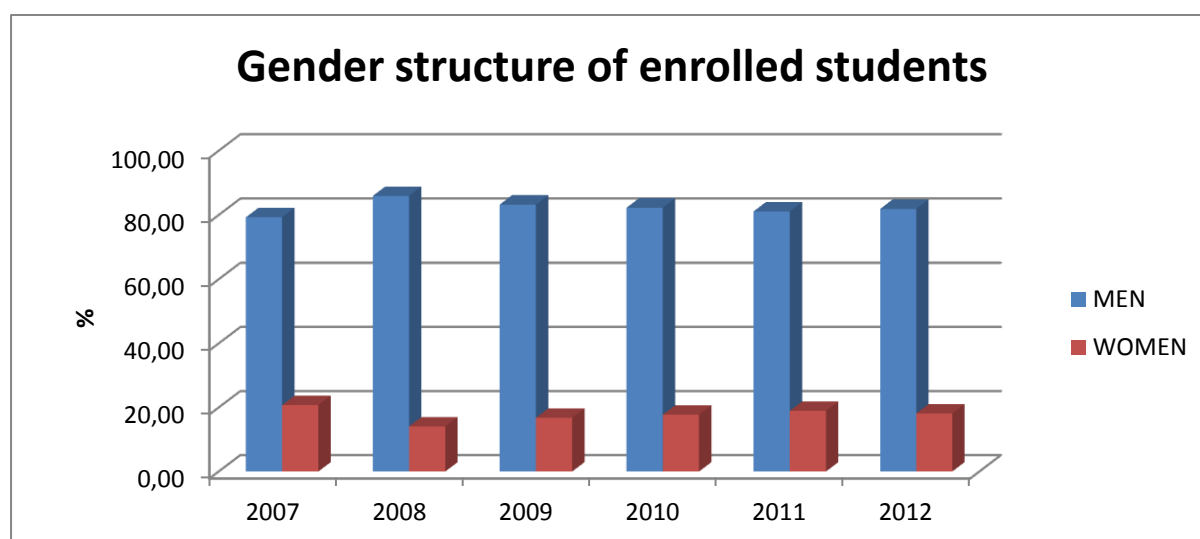


Figure 7.19 MF UN- Gender structure of students enrolled in Undergraduate Degree Programs

Table 7.22 MF UN - Gender structure of engineering graduates

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	52	8 (13.33)
2008	70	10 (12.50)
2009	65	21 (24.42)
2010	86	11 (11.34)
2011	77	23 (23.00)
2012	81	17 (17.35)

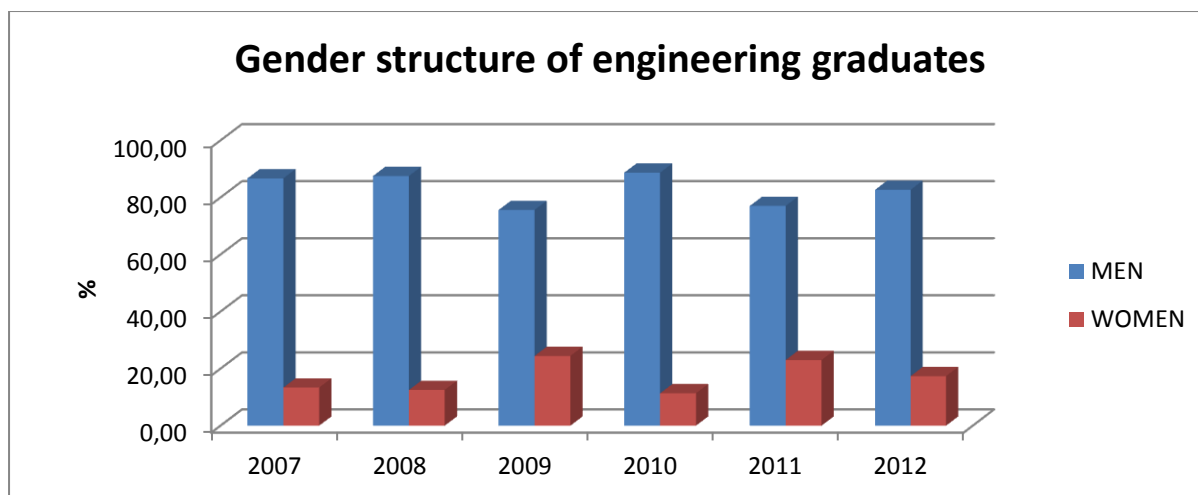


Figure 7.20 MF UN - Gender structure of engineering graduates

In the years from 2008 to 2012 the slight growth in percentage of females undergraduates enrolled at the Faculty of Mechanical Engineering in Nis is observed. Female enrollment ratio is around 18 percent in 2011 and 2012. However, the number of female engineering graduates is unstable. There is a significant growth in share of female engineering graduates in 2011 and it declines from 23 to 17.35 percent next year.

7.2.8. Faculty of technology in Leskovac, University of Nis

Data obtained from the Office of Undergraduate Studies at the Faculty of Technology in Leskovac is shown in Tables 7.23 and 7.24. Their illustration is given in Figures 7.21 and 7.22.

Table 7.23 TF UN- TF UN - Gender structure of enrolled students in years 2007-2012

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	8	25 (75.76)
2008	26	32 (55.17)
2009	46	59 (56.19)
2010	31	78 (71.56)
2011	40	80 (66.67)
2012	42	80 (65.57)

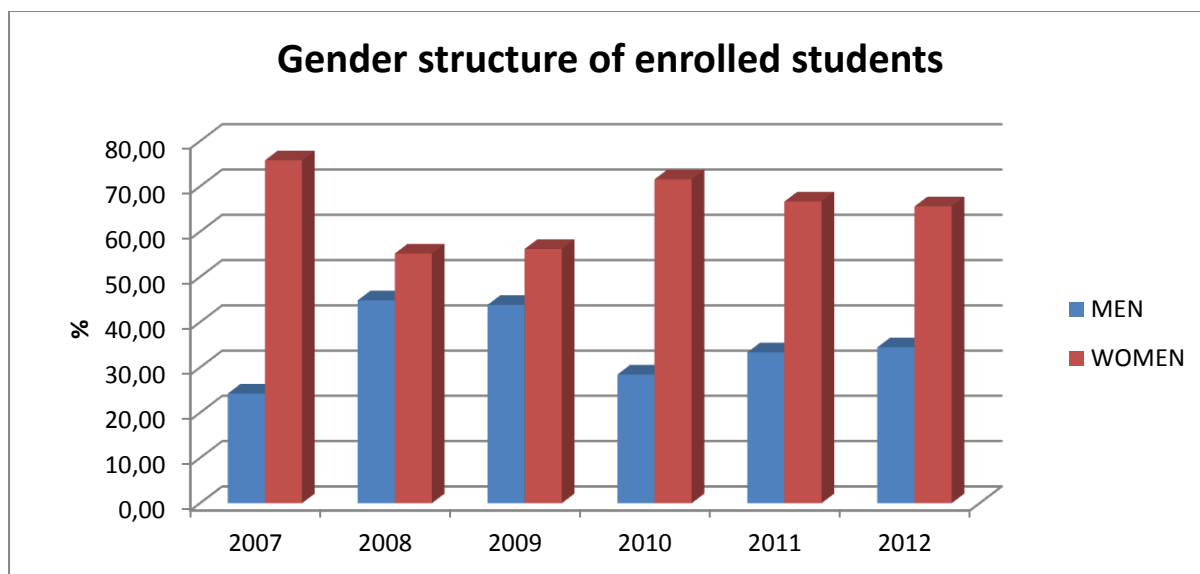


Figure 7.21 TF UN - Gender structure of enrolled students in years 2007-2012

Table 7.24 TF UN - Gender structure of engineering graduates

YEAR	MEN	WOMEN
	NUMBER	NUMBER (%)
2007	6	14 (70.00)
2008	6	17 (73.91)
2009	1	10 (90.91)

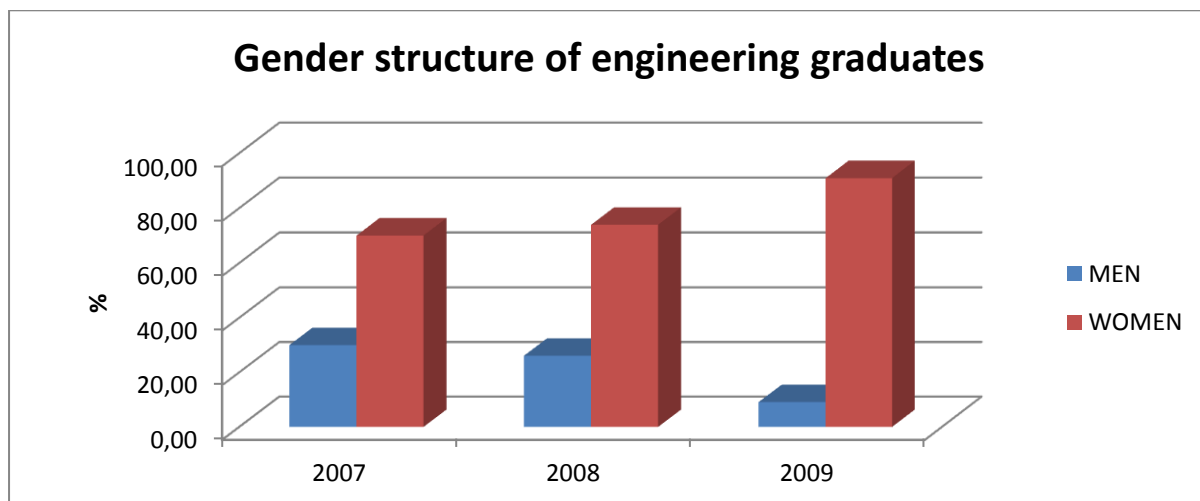


Figure 7.22 TF UN - Gender structure of engineering graduates

The Faculty of Technology in Leskovac is distinguished by the share of enrolled females and female engineering graduates. Women have substantial advantage over men and women's participation in the number of engineering graduates is 90.91 percent in 2009.

One of the major contributors that affects the labor market gender disparity is gender education gap. A substantial increase in women's participation rate in pursuing an engineering education can narrow the gender gap in labor force. The analysis of collected data from leading technical faculties in the country has shown that women are still outnumbered by men in engineering education and the gender balance has not been established yet. Results show a substantial decline in the number of female students enrolled and graduated in engineering fields at some faculties in recent years.

7.3. Conclusion

This chapter provides relevant information of women's representation in a number of engineering graduates at higher education institutions in Serbia. Initial observation regarding the structure of higher education system in the country and a number of students enrolled in nature science and engineering education is given. In addition, analysis of graduate careers by gender representation is presented. It shows that men still earn a majority of diploma in electrical and computer engineering, transport and traffic engineering, while women overwhelmingly dominate among architecture, textile industry and environmental protection field in the years from 2009 to 2011.

The main finding is that the proportion of engineering degrees awarded to females shows a decreasing trend over the years, not just at undergraduate level but also at graduate level. From previous research, particularly from the project report called CPN "The participation of women in science-way forward", is identified a stereotype of engineering as traditionally male dominating profession to be the main obstacle to increase the share of female students enrolled in engineering education. Furthermore, there is an opinion that women are not quite aware of variety of options engineering career has to offer. Regardless of the causes, the findings of this study encourage further analyzes and creation of a good work learning environment for girls to pursue engineering careers.

Therefore, it is necessary to improve the programs and methods of compulsory ICT literacy for children at lower levels of education and to intensify the promotional campaigns in order to popularize natural science and engineering careers among young girls, particularly in the field of information technologies. Schools and faculties must keep accurate data regarding student gender in their databases and to monitor progress towards gender equality. Moreover, it is important to establish the mechanisms for monitoring the employment process of engineering graduates, as well as the first opportunity to work in their profession. The informal learning IT programs for women who did not have opportunity to gain IT knowledge and skills in school should be developed.

8. RESULTS OF FIELD RESEARCH

This chapter deals with data that are gathered during field research on gender differences in computer and Internet use in the context of labour market. A detailed and systematic analysis of gender differences was carried out using the existing statistical indicators, as well as on the basis of data obtained from field research on a national sample of 400 respondents.

8.1. Computer and Internet use in Serbia

Only as of 2013 number of ICT users²⁷ in Serbia went over 50%²⁸, which places Serbia among EU countries with lowest ICT penetration – Romania and Bulgaria²⁹. However, an encouraging fact is that number of ICT users continues to grow every year and just in the last year number of user grew by approximately 7%. Data collected by Statistical Office of the Republic of Serbia (hereinafter, SORS) on structure of ICT users in Serbia shows that possession of a computer and Internet use are significantly connected to socio-demographic factors, which is a characteristic of an early expansion phase of ICT use³⁰. In Serbia computers and Internet are primarily used by young persons, urban population, persons with higher level of education and with higher income. According to current data of SORS (2013), young persons (16-24 years old) are the most common users of computers (95.1%) and Internet (93.7%). In each successive age group number of computer and Internet users significantly decreases and gets to only ten percent in the group of people older than 65 years. A direct connection with education can also be seen as 83% of people with higher education, 72.8% of people with high school education and only 30.4% of people with primary education use computers. All university students that were included in SORS research use computer, employed people use computer in 81.6% of cases, while barely one half of unemployed persons use computer (52.5%). In comparison with rural households urban households more often possess a computer (66.3% compared to 50.9%) and there is even more significant difference in relation to Internet connection (63.8% compared to 42.5%). This is particularly because rural infrastructure and financial status of rural households are worse. Financial status proves to be one of the key determinants of computer and Internet use in Serbia. Only 47.2% of households with an average monthly income lower than 300 euro possess a computer compared to 76.4% of households with average income between 300 and 600 euro and 88.9% of households with average income higher than 600 euro. The same applies for Internet connection and number of Internet connections in poorest households is even lower – 39.5%.

As expected, Internet in Serbia, as in all other countries, is used for information and communication purposes, most commonly for e-mail (70.4%) and visiting social networking

²⁷ In this report „ICT user“ means a person that uses computer and the Internet. Although, in a broader sense, cell phone use can also be classified as ICT skill, it wasn't analyzed here.

²⁸ SORS, 2013.

²⁹ ITU, 2013.

³⁰ Chen, W., Boase, J. and Wellman, B. (2002), *The Global Villagers: Comparing Internet Users and Users around the World*, in Wellman, B. and Haythornthwaite, C., *The Internet and Everyday Life*, Blackwell, Oxford

platforms (68%), but there is also a growing number of people that use programmes specialized for making telephone calls over the Internet (53.2%). One more characteristic of Internet use in Serbia is underdeveloped online commerce (e-shopping) with only 35.5% of users bought something over the Internet at least once, as well as underdeveloped e-government with only 24.5% of users that have ever downloaded or sent a completed form to a government institution. Internet is also very rarely used for personal education (5.7%) or for participation in professional networks (17.4%).

8.2. Gender differences in ICT use in Serbia

Computer use in Serbia is more or less dependent on users' gender. It means that every year in Serbia there is more men than women that use computer and the Internet (Figure 8.1 and Figure 8.2). However, when you look at these two figures closely, you can see two positive trends developing. Number of computer and Internet users continues to grow every year and difference in number of male and female computer users decreases over time.

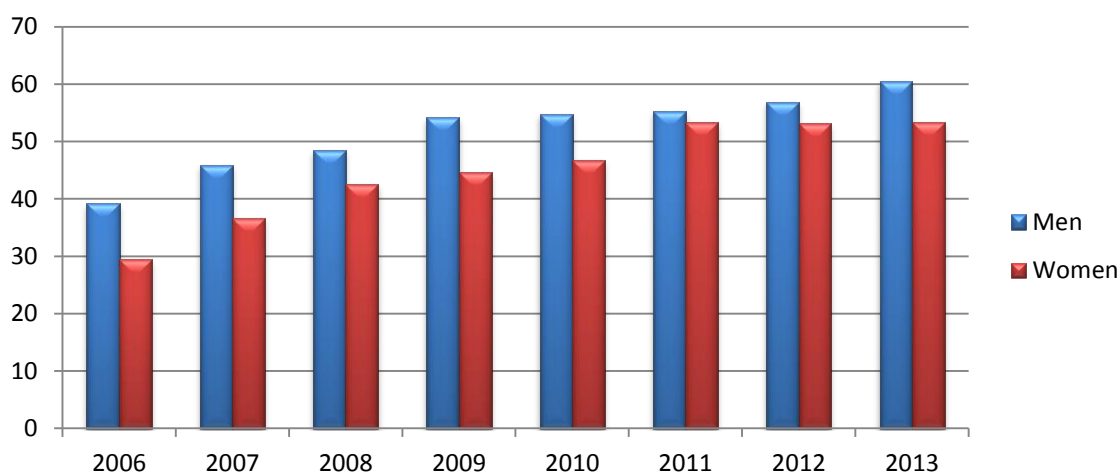


Figure 8.1 Computer use by year and gender (SORS, 2006-2013.)

Smallest difference in number of male and female ICT users was recorded in 2011. According to SORS data for 2013 this trend unfortunately stopped and we can only hope that it is only a temporary situation. Data for 2013 also shows that there is 7% more male than female users.

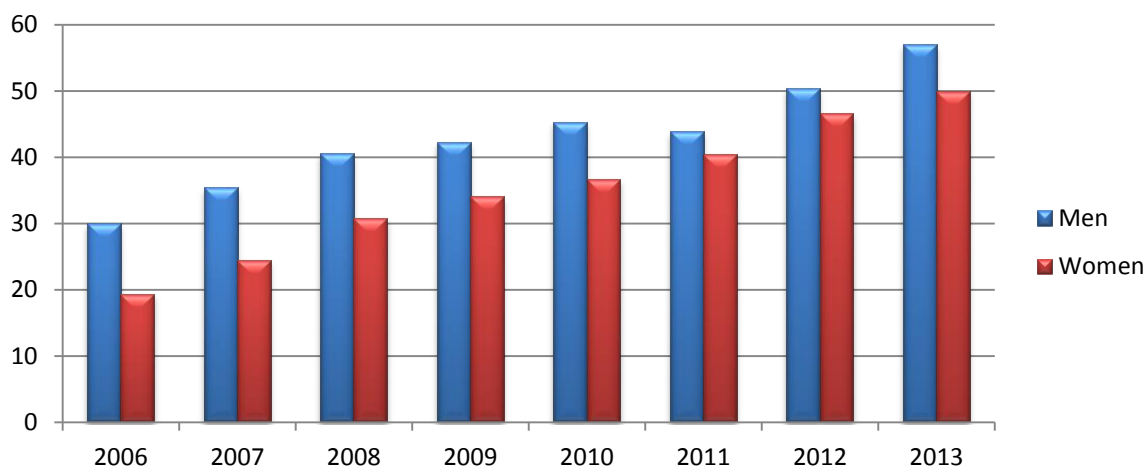


Figure 8.2 Internet use by year and gender (SORS, 2006-2013.)

Although data for 2013 present a negative surprise in regard of gender representation of ICT users in Serbia, the fact that women surpassed men in one of the user age categories is encouraging. In the age category of young Internet users (16-24 years) there is a slightly higher number (0.8%) of female users. Detailed distribution of computer and Internet use is shown in Figure 8.3.

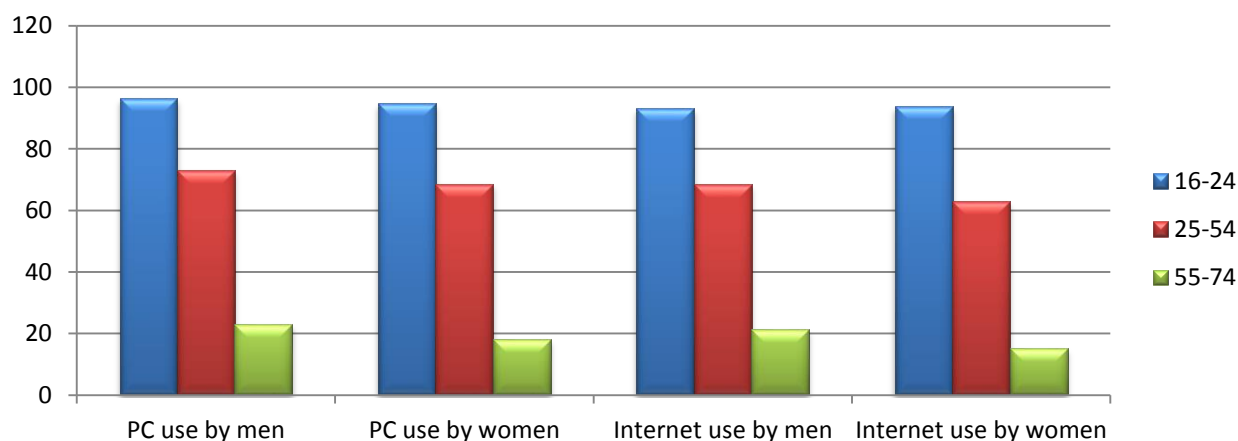


Figure 8.3 Computer and Internet use by gender and age (SORS, 2013.)

In terms of differences in level of ICT competency, i.e. computer literacy, we can refer to most reliable data that a researcher could use – data from census that was held in Serbia during second part of 2011 (Figure 8.4).

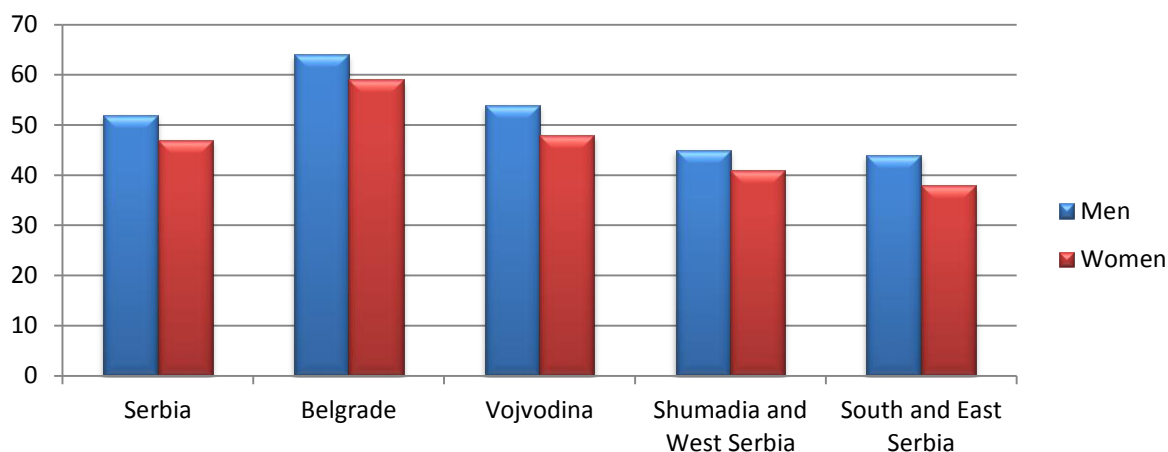


Figure 8.4 Computer literacy by gender and by region³¹ (<http://popis2011.stat.rs/>)

As Figure 8. 4 shows, in Serbia generally and as well as in all of its' regions, men have higher levele of computer literacy in comparison to women. The observed differences aren't large, but they are stable, which shows that there are some structural reasons that underlie the fact that men have higher computer literacy level than women. That is exactly one of the issues that we will deal with in the following analysis. Besides that, it can also be observed that residents of Serbia's capital have the highest level of computer literacy which is the consquence of better developed IT infrastruture in Belgrade, better financial status and higher average education level of Belgrade citizens.

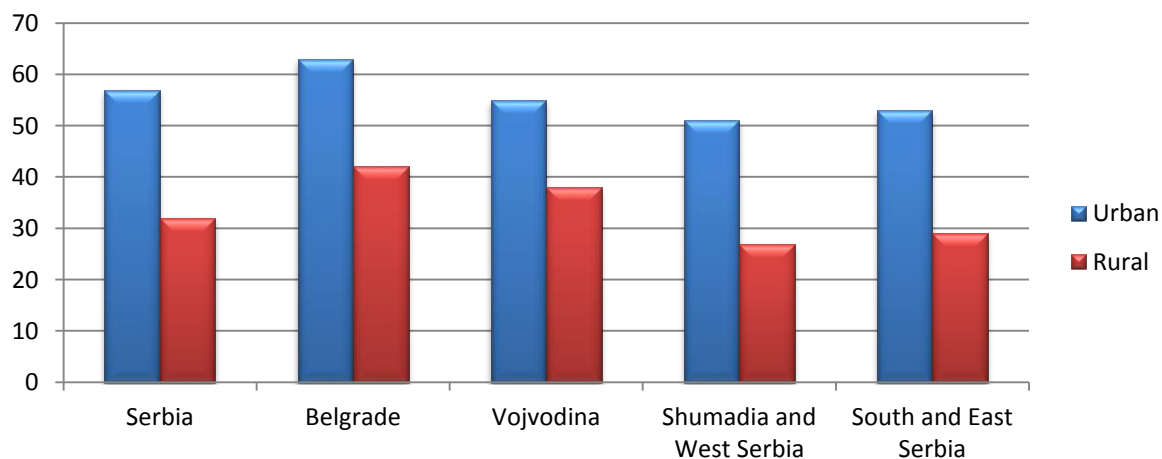


Figure 8.5 Computer literacy of women by region and type of settlement (<http://popis2011.stat.rs/>)

Census data also shows differences in women's level of computer literacy in relation to whether they live in the countryside or in a city. As Figure 8.5 shows, type of settlement, rural or urban, highly affects women's level of computer literacy. There are slight differences between regions, but we can conclude that women living in cities have almost two times higher level of computer literacy compared to women living in the countryside. Bearing in mind the fact that approximately one third

³¹ Partially literate persons included

of population in Serbia still lives in the countryside this indicator must be taken into serious consideration. Structural reasons that cause this high difference between computer literacy of urban and rural women can be attributed to far worse financial conditions in the countryside, less educated population and underdeveloped IT infrastructure.

This difference in ICT competency level reflects to labour market also, primarily in IT sector. Although ICT led to increase of employment rate, including women employment rate, there is still a prevailing opinion that these are traditionally male jobs and employers still prefer male IT experts. One of the very few research studies on position of women in IT sector shows that there is a certain lack of confidence in women employed in this sector in regard of their capability to lead large and complex project which are typically assigned to men and that subsequently leads to more men being assigned to managerial positions³².

When we sum up everything previously mentioned we get a profile of ICT user in Serbia. Computer and Internet users in Serbia, who are in the majority since recently, are mostly young and urban individuals that have higher education and financial status. Men use computer and Internet more often than women and they have higher level of computer literacy. However, there is a positive trend among young users. Men and women are completely equal in terms of computer and Internet use and in some cases women use computer and Internet even more frequently than men.

³² Pajić, A. i Bečejski Vujaklija, D. (2012), Where are the women in IT Serbia, Symposium of Organizational Sciences-SymOrg 2012, Zlatibor, Srbija

8.3. Analysis of survey research data

In order to deepen the analysis of gender differences in computer and Internet use in the context of labour market we conducted a survey research study on ICT usage in Serbia. Survey was conducted during november and december of 2013. In accordance with project objectives and indicators, questionnaire was split into 5 sections: ICT access, computer literacy, ICT use, social resources on the Internet and ICT value orientation. We used quota sample consisting of 50 respondents from each of eight selected settlements, giving the total of 400 respondents. The main criteria that we used for selection of representative settlements was to cover all existing regions in Serbia, except Kosovo and Metohija (Belgrade, Vojvodina, Šumadija and West Serbia, South and East Serbia). We selected two units of analysis from every region – one urban and one rural. In this way we covered eight representative units of analysis, i.e. four urban and four rural settlements (detail sample distribution is shown in table 8.1).

Table 8.1 Distribution of sample by region and type of settlement

Settlement	Region	District	Type of settlement	Sample size
Beska	Vojvodina	South Backa	Rural	50
Novi Sad			Urban	50
Vozdovac	Belgrade	Belgrade	Urban	50
Barajevo			Rural	50
Uzice	Shumadia and West Serbia	Zlatibor	Urban	50
Ljubovija			Rural	50
Zajecar	South and East Serbia	Zajecar, Bor	Urban	50
Brestovac spa			Rural	50

Speaking on socio-demographic distribution of the sample, because of the nature of the project we paid attention to include approximately the same share of male and female population, different age groups and different employment categories, with at least 10% of unemployed persons and 10% of persons that don't use the Internet. That gave as the opportunity to cross tabulate answers from different socio-demographic categories during the analysis and get conclusions on female population ICT use, primarily in the context of access to the labour market.

As Figure 8.6 shows, age and gender structure of our respondents was relatively balanced and included all age categories. Although there is more significant imbalances in first two categories, it didn't affect subsequently conducted answers cross tabulation. Elderly persons are the least represented in the sample which is understandable since ICT use highly depends on users' age. As already mentioned in the introduction, general ICT use in Serbia sharply drops in category of persons older than 55 years.

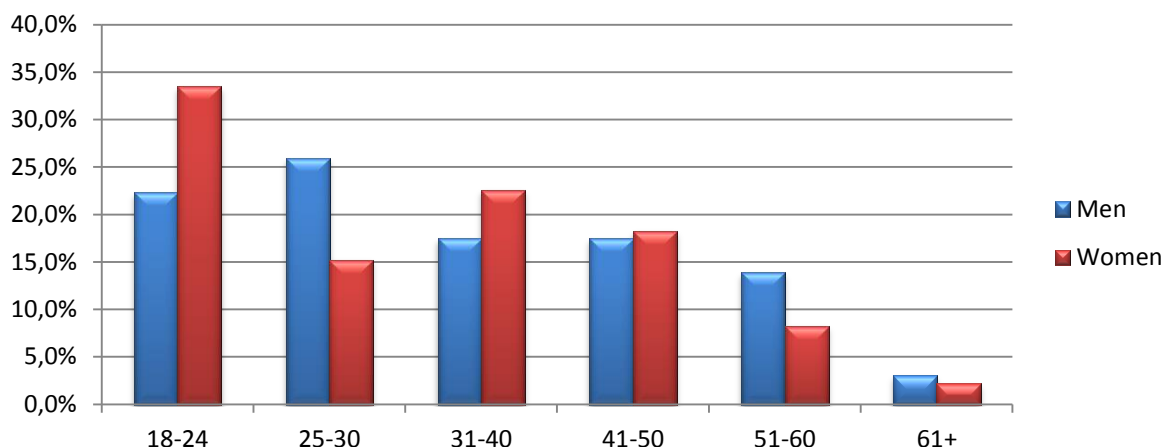


Figure 8.6 Gender and age structure of respondents

Occupational structure is also well balanced, both by gender and by employment categories (Figure 8.7). We paid attention that unemployed persons were also included in the sample, so that through analysis we could find out if and how their use of computer and the Internet is different compared to other employment categories. Logically, only category that didn't contain male respondents is the housewives category, since in Serbia housework is still traditionally considered to be women's responsibility.

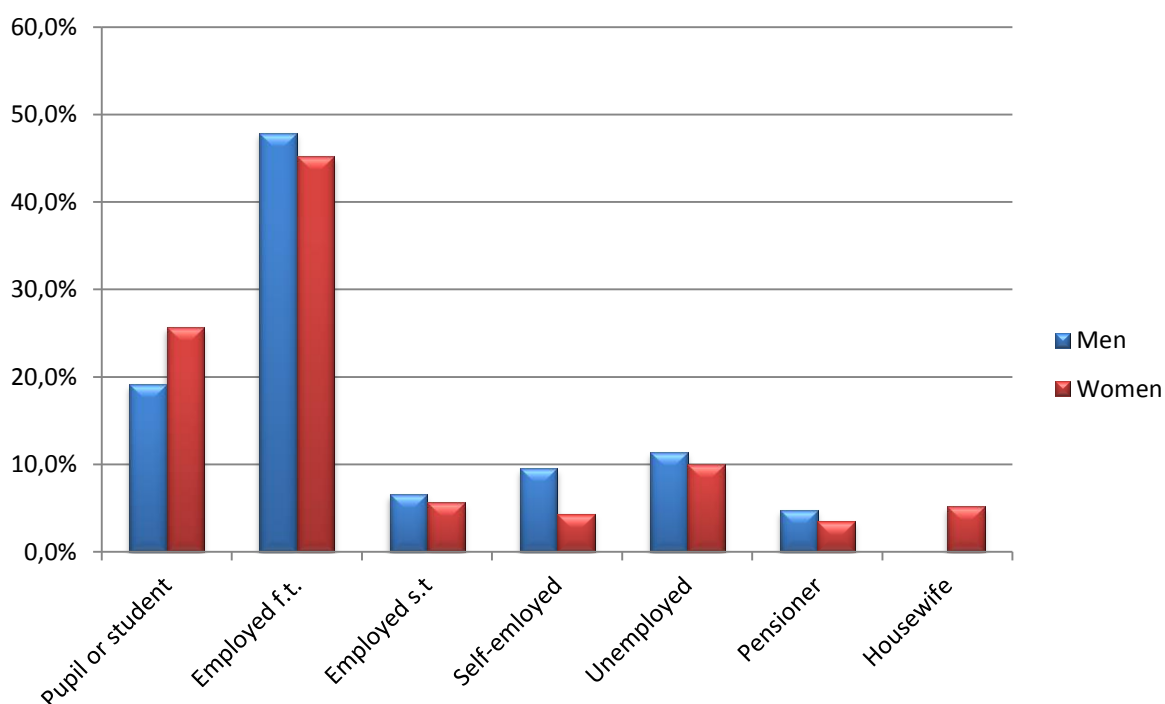


Figure 8.7 Gender and occupational structure

Figure 8.8 shows that educational structure of our respondents is well balanced by gender. Respondents have better education than average education in Serbia, but it is the consequence of ICT users in general being better educated than non-users.

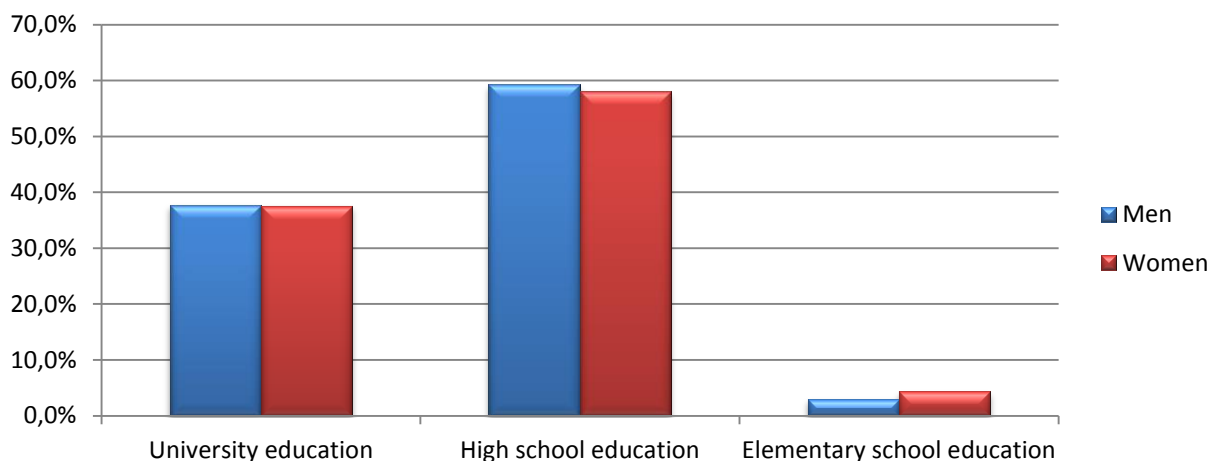


Figure 8.8 Gender and educational structure

Speaking of financial status of our respondents (Figure 8.9), most of them come from the households with monthly income between 300 and 600 euro, which is consistent with average household income in Serbia. However, proportionately large share of households with monthly income of 600 euro (36%) confirms earlier findings that ICT users have better financial status than non-users. This is understandable since computer and Internet use implies spending on hardware and Internet connection.

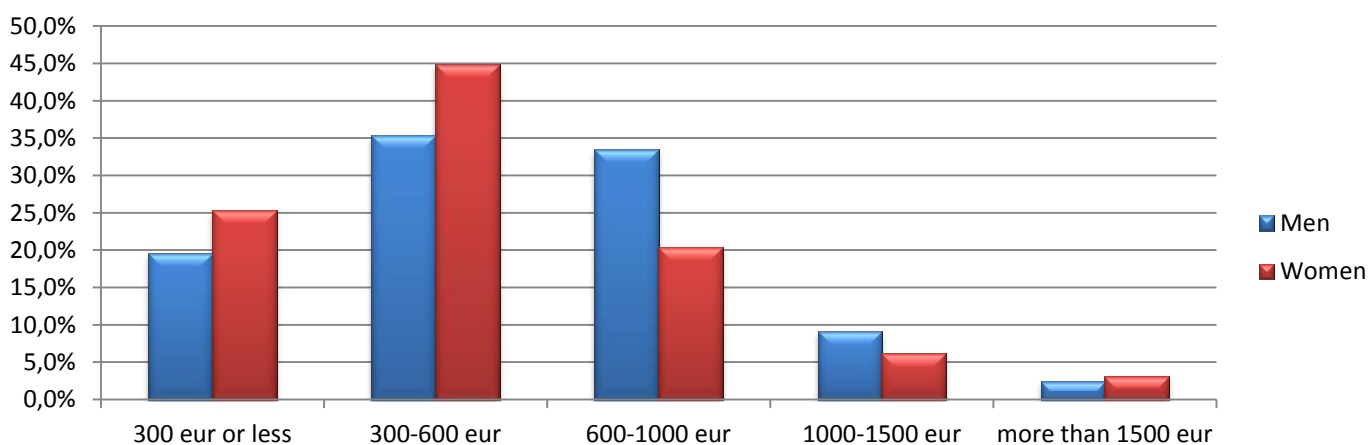


Figure 8.9 Structure by gender and household monthly income

8.3.1. Access to ICT

Population included in our sample uses computers and Internet more than average population of users in Serbia. Over 80% of respondents use computer and access the Internet at least few times a week and for most of them it is a part of daily routine (almost 70% of total sample). On the other hand, almost 10% of our respondents don't use computer or access the Internet. Some of the most

common reasons for not using the Internet that our respondents stated were: there is no possibility of accessing the Internet in their place of residence, Internet connection is too expensive, etc.

There is a significant statistical connection between computer and Internet use and household monthly income ($p=0.02$ and $p=0.05$), respondents' occupation (both at $p=0.001$), respondents' age (both at $p=0.001$) and education ($p=0.02$ and $p=0.001$). In other words, our results confirm a well-known fact about computer and Internet users in Serbia – they are young, employed individuals with higher education and better financial status. On the other hand, persons with worse financial status, especially those living in households with monthly income lower than 300 euro, persons that have lower than high school education, unemployed persons, pensioners or housewives, as well as persons older than 40 years of age, use computers and Internet proportionally less. It is interesting that in our sample type of settlement doesn't have an important role in relation to ICT availability. Although, there is a slightly larger number of rural households to which computers and Internet aren't available (12.1%) compared to urban households (7.1%), this difference isn't statistically significant.

From the standpoint of our research it is important that ICT availability isn't determined by respondents' gender, since men and women are almost the same in relation to frequency of computer and Internet use (Figure 8.10 and Figure 8.11). Data we collected is slightly more favourable for women in comparison to data collected by SORS (2013), which was already discussed in the introduction.

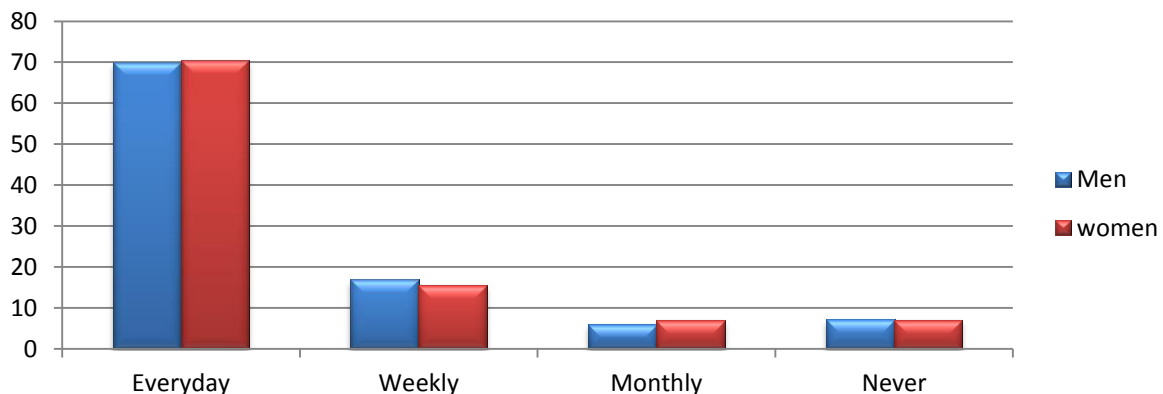


Figure 8.10 Frequency of computer use by gender

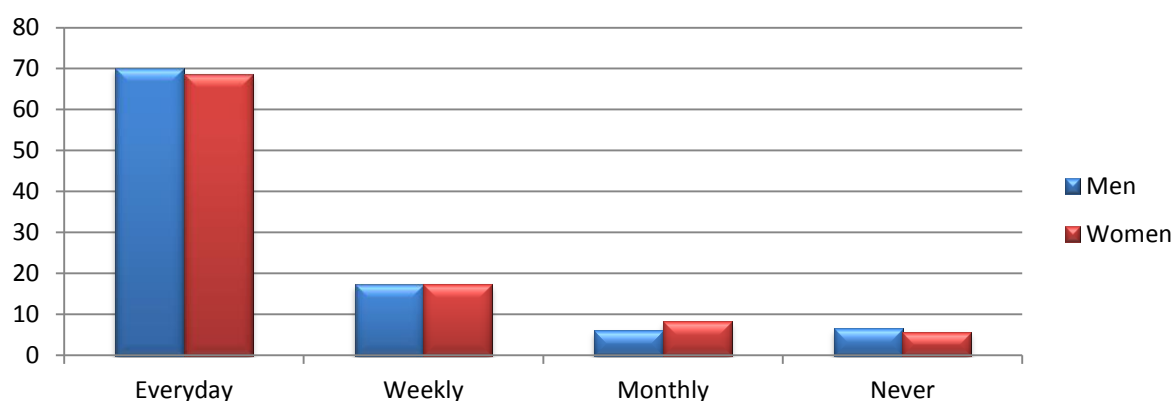


Figure 8.11 Frequency of Internet use by gender

In terms of user occupation, most regular computer users among women are university students, followed by women from different employment categories (table 8.2). Regular computer use starts to decline in the category of unemployed women, and drastic decline can be seen in the pensioners and housewives category. However, this data isn't so much related with gender discrimination but rather with age and educational determinants which, as we saw earlier, have significant impact on computer use of general population. With regard to female pensioners, all data from Serbia, as well as general data, shows that elderly persons and pensioners in particular are least inclined to use computers. The situation is the same with housewives. None of the housewives included in our sample had higher than high school education, which indirectly affects frequency of computer use. The fact that unemployed women use computers less regularly than employed women is important in the context of our project and it can be a significant indicator of connection between employment and computer use.

Table 8.2 Frequency of computer use by occupation (female respondents)

	Daily	Weekly	Monthly	Never
University students	88.10%	10.20%	-	1.70%
Employed – full time	72.10%	14.40%	6.70%	6.70%
Employed – part time	69.20%	30.80%	-	-
Self-employed	80.00%	20.00%	-	-
Unemployed	65.20%	17.30%	8.60%	8.70%
Pensioners	12.50%	37.50%	25%	25.00%
Housewives	16.70%	8.30%	41.70%	33.30%

8.3.2. Computer literacy

Besides availability, computer literacy is one of the key indicators of ICT use in general, i.e. an indicator of capability of different categories of users to use a computer. In this case we were mostly interested in gender differences concerning level of computer knowledge (table 8.3). As answers that we presented show, men dominate in all computer literacy indicators, which is a very indicative finding. Therefore, although there aren't any significant gender differences in relation to computer and Internet availability, when you scratch beneath the surface there are significant gender differences to be seen concerning computer literacy. Smallest differences in computer literacy level

exist for basic operations like Internet browsing. However, there are more noticeable differences on intermediate computer literacy level, for example creating PP presentation or Excel tables, and it ranges up to 10%, but differences become significant when it comes to more advanced operations like file compression, installation of new hardware or operating system with almost three times larger percent of man having higher computer literacy level than women. What strikes us as interesting is the fact that on the highest level of computer literacy, which is knowledge of computer (programming) languages, there is no significant difference, since it amounts to only 7% in favour of male population, but we will discuss this matter later.

Table 8.3 Computer literacy of men and women

	Men	Women
Using Internet browser	91.6%	90.0%
Sending e-mails with attachments	74.1%	64.6%
Using copy or paste function in Word or similar programme	69.3%	66.8%
Moving files between computers and other devices	63.3%	61.1%
Creating tables in Excel or similar programmes	59.6%	49.3%
Compressing (zipping) files	49.4%	30.1%
Connecting or installing new hardware	49.4%	27.9%
Creating electronic presentations in Power Point or similar programmes	46.4%	38.0%
Installing new or replacing old operating system	36.7%	11.8%
Writing a computer programme using special programming language	19.3%	12.2%
None of the above	6.6%	7.4%

Of course, it is hard to find the reasons behind different levels of computer literacy if you take into account that educational system in Serbia provides basic computer training for both men and women³³. Even more confusing is the fact that in the category of young users (up to 30 years old) who had informatics as a compulsory subject in high school, these differences are more drastic, although almost completely the opposite result should be expected. For example, in regard of ability to (re)install operating system, as many as 50% of young male respondents say that they know how to do it compared to almost four times smaller number of girls (15.2%), 65% of men are able to zip files compared to 35.7% of women, while connecting new devices doesn't present a problem to more than two thirds of men (68.8%) compared to one third of women (35.7%). These differences are stable even in the category of highly-educated young people, although level of computer literacy is generally higher for both men and women (installing – 60% (m) compared to 14.3% (f), zipping – 80% (m) compared to 45.7% (f) and for connecting new devices – 88% (m) compared to 54.3% (f).

It is definitely hard to make definite conclusion on different level of computer literacy of men and women without some deeper analysis, but it can be presumed without any doubt that these

³³ Klem, N. (1998) Nastava računarstva i informatike u gimnazijama, Predavanje na Republičkom seminaru o nastavi matematike i računarstva, Beograd, preuzeto sa:
<http://elib.mi.sanu.ac.rs/files/journals/nm/211/nm431207.pdf>

differences are partly based on traditional and patriarchal sociability pattern in Serbia that supports behaviour and value patterns in which male children are favoured to work with technical tools and devices, in contrast to girls that are directed to, conditionally speaking, housework or more sophisticated, i.e. so-called female activities. This is probably the case of generational transfer of desirable activities from father to son and from mother to daughter. Since in the past working with technology required physical strength these activities were mostly performed by men. However, over the time technologies became more and more sophisticated and physical strength became less important, so existing differences in technology use can only be explained by traditional value patterns, which will be discussed later.

One more computer literacy indicator that we used was respondents' perception of need for additional computer training (Figure 8.12). Similar to abovementioned data, these data also shows that women emphasize the need for ICT education more often than man. Only in regard of web design training there is a slightly higher percentage of men (1%) that emphasize the need for this type of training.

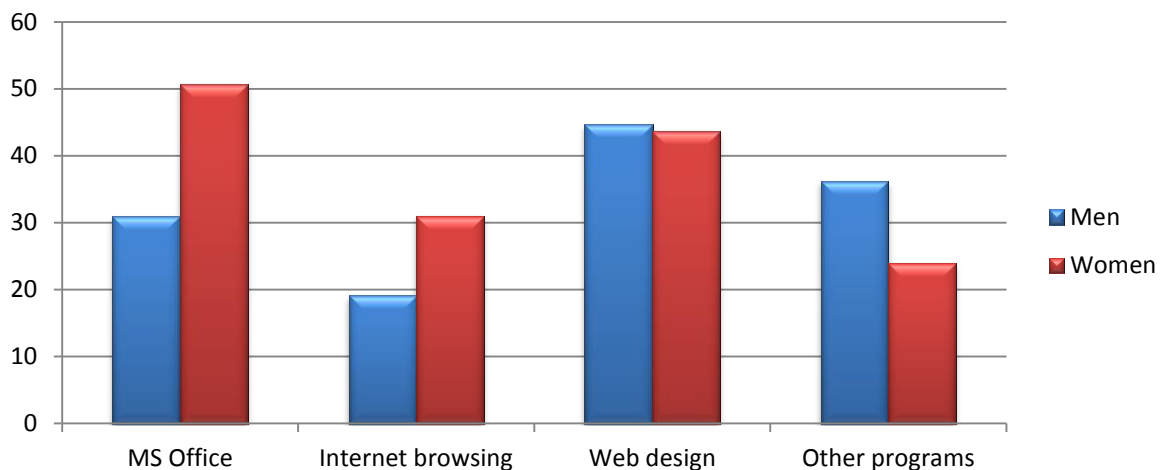


Figure 8.12 Subjective evaluation of need for additional training shown by gender

This case also shows differences between answers of men and women that are stable in different age groups and on different levels of education, so the reasons once again must be sought in different models of computer use. Since both men and women had an opportunity to gain the same level of computer literacy through formal education, greater knowledge of certain programmes and tools that men showed could be explained by the fact that they, on their own, actively improved their computer literacy during the life, while women were more passive regarding self-education in computer use. On the other hand, in regard of web design, since these programmes are more complex than Internet browsers and MS Office, it is harder to self-educate in this area of computer use. This could also be the explanation for the earlier-mentioned fact that there isn't much difference between men and women in highest computer literacy level – programming (7%). It is understandable why perceived differences in computer literacy level are smaller, since this level of computer literacy is primarily achieved through some kind of specialized training, and it would be much harder to achieve it by individual work.

Unemployed women show significantly lower computer literacy level compared to employed women, which is an important indicator from the standpoint of our project. It is encouraging that women from this category show similar need for additional computer training (MS Office training in particular) as employed persons. But, on the other hand, there is a large number of unemployed women (43.3%) that don't think that they need additional computer training, which means they don't recognize the importance of improving their ICT skills that could help them finding job in the future.

8.3.3. Computer and internet use

In terms of computer use, we were primarily interested in its potential business application. As Figure 8.13 shows, there are no significant differences between employed men and women in relation to using of computer at work. About one quarter of employed men and women don't use computer for work, and data from other categories are similar. It is interesting that there are more women (5%) in the category of respondents that consider computer their essential work tool, but these differences have be taken with caution if you bear in mind characteristics of our sample. Besides that, mere fact that some people consider computer to be their essential work tool speaks a lot about characteristics and complexity of its use, since both programmers and counter clerks could be classified in this category.

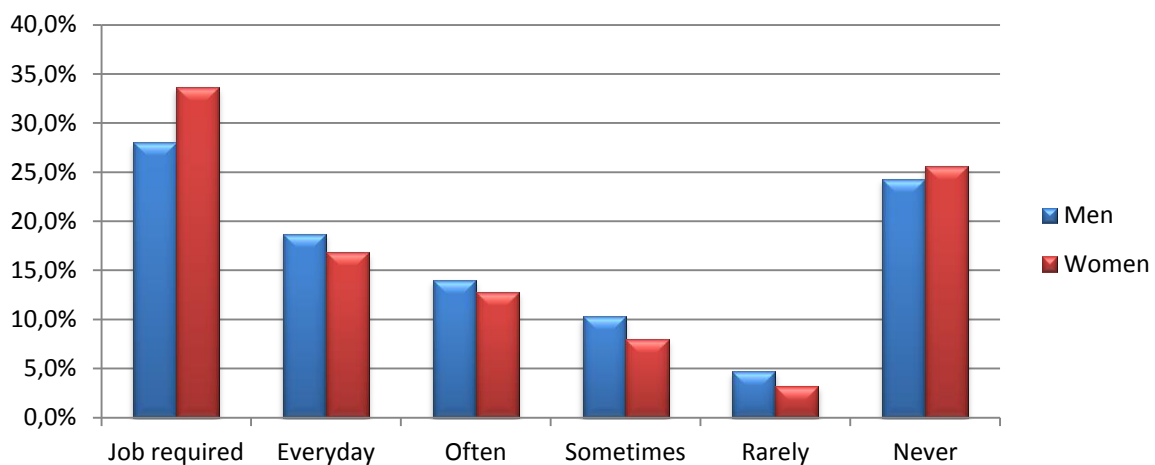


Figure 8.13 Using computer for business purposes in the category of employed men and women

One of indicators that we used was using of computer for possible additional work (Figure8.14). Figure shows that men lead in all three categories, with almost two times more men than women performing these activates. Since we are not familiar with actual occupations of our respondents it was impossible to determine the type of additional work for which computer is being used, but the fact that men are slightly to moderately dominant in all categories related to frequency of additional work shows that in comparison with women men find better ways to cash in on their IT skills. However, this difference could also be explained by traditional expectation after working hours women should be the one responsible for housework. In these circumstances, men are the one that more often have a chance of doing additional work.

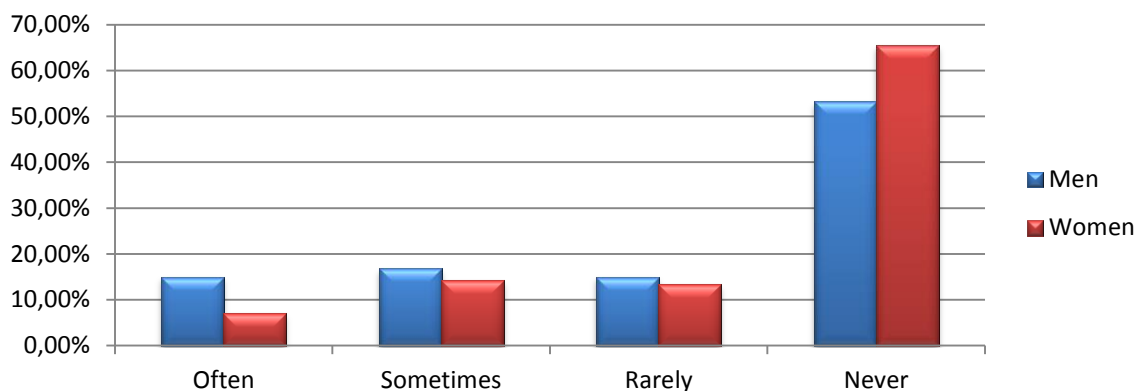


Figure 8.14 Using computer for additional work shown by gender

Internet use is also mediated by gender differences, which can clearly be seen from Table 8.4. A few interesting gender characteristics can be found by careful analysis of answers. First of all, men are once again dominant in almost every category. Only two types of Internet use that women are more prone to are participating in online social networks and searching for health-related information. Speaking of maintaining social relations, previous sociological research shows that women are the one that more often take the responsibility of maintaining social relations, especially in regard of family networks. Searching for health-related information could also be explained by traditional patterns of caring for children and elderly that women in most case take upon themselves³⁴. On the other hand, men are slightly dominant in categories related to searching for various information on the Internet and sending e-mails and they are extremely dominant in some other types of Internet use. That is the case with Internet activities that are considered to be risky, like online shopping or paying or online betting. This also seems to be a product of transferring of social patterns from everyday life to the Internet, since men are usually more prone to risky behavioural patterns. It is primarily consequence of different family and peer-group socialization of men and women, where men are forced to be tougher, more determined, more enterprising, but also a consequence of difference in physical strength between men and women, that makes women behave more carefully.

Research also shows that men are far more interested in downloading software from the Internet, which once again shows that they are more prone to technological use of computer. However, fact that is particularly interesting for our research is that almost twice more men join professional networks on the Internet and that men more often apply for a job over the Internet, which shows that they have much better recognition of computer use for business purposes. This finding was also confirmed by interviews that we conducted and which will be analysed in the second part of this report.

³⁴ Milić, A. (2010), Porodične vrednosne orijentacije-vrednosni raskol, u Milić, A i dr., Vreme porodica-sociološka studija o porodičnoj transformaciji u savremenoj Srbiji, Institut za sociološka istraživanja FF, Beograd

Table 8.4 Internet use in relation to gender

	Men	Women
Sending/receiving e-mail	83.3%	76.1%
Participating in social networks	67.9%	71.1%
Reading or downloading online newspaper/magazine	61.5%	59.2%
Searching information about goods and services	56.4%	50.0%
Searching information about education, courses	52.6%	51.8%
Using travel and accommodation services	44.9%	40.4%
Downloading software	39.1%	17.9%
Searching health-related information	36.5%	47.2%
Finding job or sending a job application	35.9%	24.3%
Selling goods and services over the Internet	29.5%	15.1%
Paying over the Internet	25.6%	11.9%
Participating in professional networks	24.4%	13.3%
Playing games of chance	21.8%	3.7%
Attending online courses	12.8%	9.6%

Data shows that unemployed women use the Internet to find information about education (21.7%) or to attend online courses (9.6%) less frequently than employed women. Only type of Internet use in which unemployed women dominate is finding job or sending job application (43.5%). Although this fact is encouraging because it shows that unemployed women recognize existing possibilities of finding job over the Internet, they still disregard possibilities of education and specialization over the Internet, which could raise their chances on the labour market. Because of that, one of the recommendations of this project will be organizing free training courses on adequate computer and Internet use in order to raise their chances on the labour market.

In regard of problems related to computer and Internet use, there are no significant gender differences that affect perception of these problems (Figure 8.15). Most of our respondents emphasize problems related to computer viruses and Internet connection. We expected that women, having lower computer literacy level, would have more worries about viruses on the Internet, but that wasn't the case. On the other hand, as expected, slightly more women than men emphasized lack of IT and language skills, but that difference amounts to few percents only.

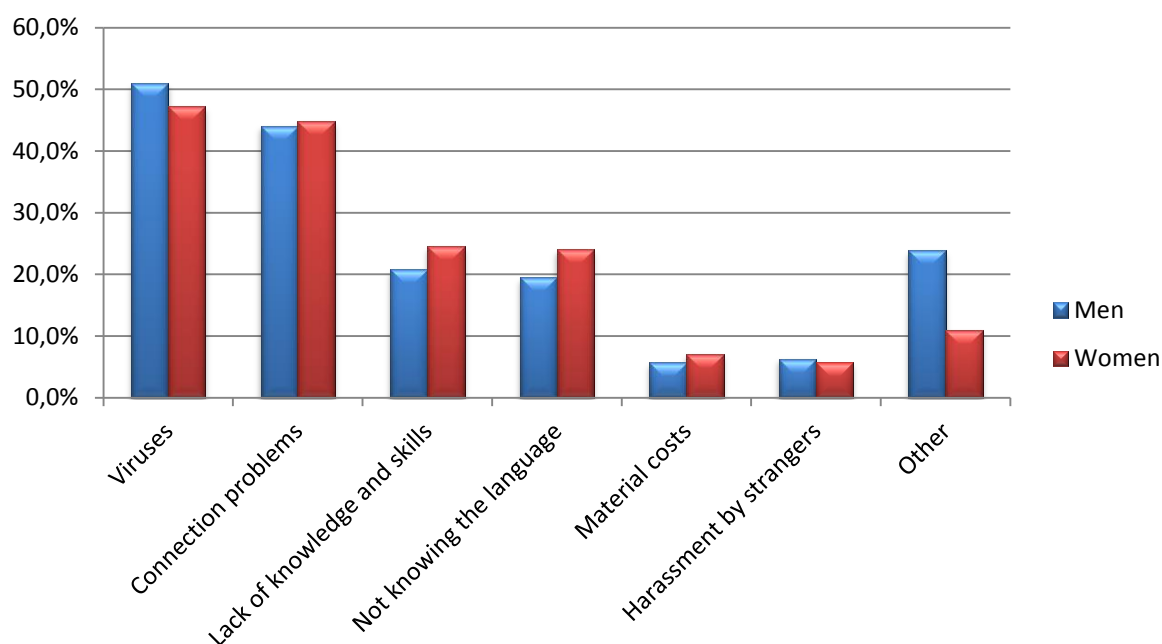


Figure 8.15 Problems related to Internet use shown by gender

8.3.4. Social capital

In contrast to financial and human capital, social capital isn't directly owned by an individual and it lies in the relationships that individual builds with other individuals, so its roots are in individual social network. Simply said, value of the social capital is higher if individual has more contacts and wider network and if other people don't have the same contacts in their networks. With the appearance of Internet more people started to use this media in order to expand their social networks, primarily by establishing contacts with persons that otherwise wouldn't be reachable. In that way, Internet is actually used to break down social and structural barriers that more or less limit every individual³⁵.

In order to research use of the Internet for enrichment of social capital, we asked questions related to establishment of new contacts over the Internet over different dimensions. However, the fact that women are, primarily because of personal safety reasons, more careful in relation to establishing contacts over the Internet should be taken into consideration³⁶ and results should be interpreted in accordance with the said fact.

Although results from table 8.5 seem to be in accordance with expectations and once again show male domination on the Internet, the picture isn't that simple. First of all, in two of eight types of Internet contacts women are more agile than men, and there are two types of contacts in relation to which differences are negligible. However, the fact that men are much more active in using Internet for finding new business opportunities is very important, as it was already noted in the earlier analysis of Internet use. Interview analysis that can be found below also shows that women aren't

³⁵ Petrović, D. (2013) Društvenost u doba interneta, Akademska knjiga, Novi Sad

³⁶ Petrović, D. (2008) U međumrežju-internet i novi obrasci društvenosti, ISI&SF, Beograd

too open or ready to use Internet for creating new business opportunities, which leads to the conclusion that they should be educated on creative use of Internet for business purposes, as it is recommended by this project.

Table 8.5 Establishing Internet contacts in relation to gender

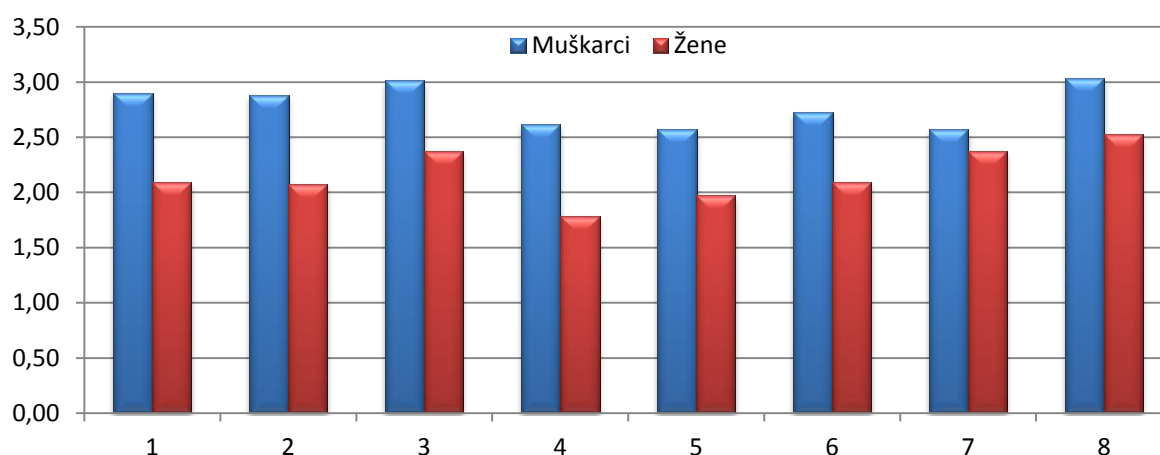
	Men	Women
To connect with people that could give you new information	71.5%	70.4%
To connect with organizations and groups you already belong to	63.2%	66.0%
To find new business opportunities	47.9%	36.0%
To connect with people of different generations	46.5%	42.4%
To connect with people of different occupation	42.4%	44.3%
To find people or groups that share your interests, beliefs, religious or national affiliation	41.7%	39.4%
To connect with people of different national affiliation	36.8%	30.0%
To connect with people of different financial status	35.4%	31.0%

The fact that over 70% of women use the Internet to connect with people that can give them some information and that women are more ready than men to connect over the Internet with organizations and groups they already belong to sounds encouraging from the standpoint of gender equality. Women are also slightly more willing than men to connect with people of different occupation, and they don't fall much behind in relation to using the Internet to find like-minded people. These facts are encouraging because they show that women aren't afraid to establish contacts on the Internet and that they are ready for instrumental use of the Internet.

8.3.5. Value orientation and gender related ICT use

One of important segments of our research was about value orientation in relation to gender roles and use of ICT. Since patriarchal and traditional social patterns still exist in Serbia, it was important to research if and how men and/or women put use of ICT technology in gender context. For that purpose we created new instrument, which is called scale of perception of gender IT competence (Percepcije rodne IT kompetentnosti – PRITK). First version consisted of 10 statements and respondents expressed their level of (dis)agreement on the scale from 1 to 5. After factor analysis, principle component analysis method PCA, scale was reduced to eight statements that belong to one factor (explaining 57% of variance) and have factor score over 0.7.

Scale in this form shows high reliability – Cronbach's alpha coefficient of 0.89. Figure 8.16 shows average score of men and women on final version of the scale (higher score indicates higher level of agreement).



1. Men learn computer skills more easily
2. Finally, men are better at computer technologies and women are better at housework
3. It is easier to con (misuse) a woman over the Internet than a man
4. I feel safer if my computer is installed (repaired) by a man
5. Men's brain is more adopted to computer use than women's brain
6. It is not natural for a woman to be a hacker
7. In a family, man is the one who should monitor children's computer use
8. If I had a company, I would rather employ a man than a woman to perform computer maintenance

Figure 8.16 Average value of answers on PRITK scale shown by gender

A mere glance at Figure 8.16 shows that men constantly express higher agreement with all statements than women. This fact isn't surprising since statements were created in favour of male use of ICT, but it clearly shows their gender perception in the context of computer use. Average scores on PRITK scale (min.8-max40) is 20.53 for men and 15.72 for women, which clearly shows that respondents' gender significantly affects his/hers perception of gender roles in relation to ICT use. This difference was also confirmed by non-parametric Mann-Whitney U test which showed that there is a statistically significant difference between men ($Md=20.5$, $n=160$) and women ($Md=14$, $n=215$) in relation to answers on PRITK scale ($p=0.000$, $U=11720$, $Z=-5.288$) with medium-sized effect calculated by Cohen's criteria (0.27).

In the other words, results gained by using PRITK scale show that women in Serbia face negative prejudice in relation to their ability to use a computer and Internet and that these prejudice are moderate. Men with lower education express negative prejudice more frequently, as well as men living in rural areas. Because of that, circumstances regarding ICT use by women having these men in their surroundings are particularly difficult.

Interesting conclusions can be made by looking at individual statements. Largest difference between answers of men and women, almost one whole grade, can be seen at statement no.1 – men learn computer skills more easily. The fact that men express relatively high average level of agreement with such a conservative statement and give it an average rating of almost 3 is pretty worrying. Even more alarming is the information that 25.2% of men completely agree with this statement by rating it 5 out of 5, with additional 15.3% that rate it 4 out of 5. There is a similar situation with statement no.2 – men are better with computer technologies and women are better

at housework. Average score of men is 2.88, with 23.3% of men completely agreeing and 15.3% rating in 4 out of 5. This attitudes could be explained by domination of traditional and patriarchal value pattern which is obviously still dominant in significant part of male population.

Men have highest average score or highest level of agreement with statement no. 8 (average score 3.04) and no.3 (3.01). Both of these statements show some kind of lack of confidence in women in the context of ICT use. Problem is that women also express highest level of agreement with these two statements, but with somewhat lower average scores (statement no.8-2.53 and statement no.3-2.38). This unfortunately shows that attitude that women are less able or competent in the context of ICT use is deeply rooted in both men and women.

What we find to be as worrying is that women give relatively high rating to statement no.7 - In a family, man is the one who should monitor children's computer use (2.38). Even more unusual is that more women than men partially or fully agree (rate 4 or 5 out of 5) with this statement (f-25.9% i m-25%). This result shows that value pattern that father is the one that is better at technology and the one to monitor technologies used in a family is transferred through family and even encouraged by women. But here it should be noted that Internet use by children in Serbia is often treated in negative context, so father figure presents an authority that is important for suppression of negative situations and situations that could be potentially dangerous for children.

8.4. Conclusion

After detailed and systematic analysis of gender differences in relation to ICT use in the context of labour market which was conducted using existing statistical indicators and field research on the sample of 400 respondents, we came to the following conclusions:

1. Every year there is more men that use computer and Internet in Serbia than women, but these differences decrease over time and tend to stabilize at a level of about 5-7%.
2. According to data of SORS for 2013, for the first time there is an equal number of male and female Internet users in young population (up to 24 years old).
3. According to data of SORS for 2013 40% of women in Serbia have never used a computer. Women living in rural areas, that have lower than high school education, worse financial status and are older than 55 years use computer less frequently.
4. According to census data from 2011 and results of our field research men have higher level of computer literacy than women, both in general population and in specific socio-demographic groups. But what we find worrying is the information that there are significant differences in computer literacy level even between highly-educated men and women. It is certainly hard to make any final conclusion on the causes of differences between men and women in relation to computer literacy level without conducting any deeper analysis. However, we presume that these differences are partly based on traditional and patriarchal form of sociability in Serbia that supports behaviour and value patterns in which male children are favoured to work with technical tools and devices, in contrast to girls that are directed to, conditionally speaking, housework or more sophisticated, so-called female activities.

Another finding related to computer literacy of women is that type of settlement highly affects its level, since women living in urban areas have significantly higher level of computer literacy than women living in rural areas. Structural reasons that cause this large difference in computer literacy level of women from urban and rural areas could be far worse financial status of rural households, under-educated population and underdeveloped infrastructure.

5. Data of SORS for 2013 shows that unemployed persons use ICT much less often than persons that are employed. Results of our research are consistent with this data, but also show that unemployed women use computer and Internet less frequently and have lower level of computer literacy than employed women. This category of women uses the Internet less frequently for educational purposes and for attending online courses or for establishing business contacts over the Internet. So, our research with any doubt shows that there is a connection between women unemployment and lower need or level of training for ICT use.
6. It can also be observed that in terms of using computer and Internet for business purposes there is almost two times more men than women that join professional networks on the Internet, as well as that men more often apply for a job over the Internet, which shows that they have much better recognition of computer use for business purposes. Also, although men and women are almost equal in terms of establishing contacts over the Internet, men are still the ones that more frequently establish contacts over the Internet that could potentially lead to new business opportunities.
7. Based on the set of statements we used to examine value orientations in relation to gender roles and ICT use, we came to the conclusion that women in Serbia face negative prejudice

about their ability to use computer or the Internet. Men with lower education express negative prejudice more often, as well as men living in rural areas. Because of that, circumstances for ICT use by women having these men in their surroundings are particularly difficult. However, it doesn't mean that other men don't have negative evaluative attitude, but only that it is less pronounced in highly-educated men or men living in urban areas. Men's level of agreement with some statements like men are more capable of mastering computer skills than women or that men are better with computer technologies and women are better at housework is worrying since around 40% of men partially or completely agrees with this kind of statements. These attitudes could primarily be explained by domination of traditional and patriarchal value pattern which is obviously still dominant in significant part of male population and as such it is transferred from generation to generation.

9. ANALYSIS OF ICT IMPACT ON THE QUALITY OF LIFE

When we talk about implementation of different aspects of ICT use, we can distinguish four main perspectives³⁷. First perspective can be defined as technicistic – since development of ICT use is observed through infrastructural prism, which implies that development of infrastructure will automatically lead to increase in the use of Internet and its services. Second perspective is legislative – within which development of ICT is observed through legal prism, which implies that only adoption of certain laws will lead to widespread ICT use. Third perspective is policy – within which spreading of ICT use is observed through institutional prism, which implies that it is necessary to develop different strategies and institutions which will make spreading of ICT use possible. Third perspective can be defined as instrumentally–utilitarian – within which main aspect of ICT use is observed through service prism. The focus is on development of services that are expected to encourage wider ICT use by their inherent characteristics. However, we should also mention one more perspective, which seems a bit neglected, and which, in our opinion, can have crucial influence on pace of spreading of ICT use. It is socio-psychological perspective, which uses social prism to emphasize aspects that have substantial influence on spreading of ICT use, but which are not clearly visible. For example, Strategy for Information Society Development in Serbia until 2020³⁸ is dominated by infrastructural and instrumentally-utilitarian perspective. This can be stated because two main elements of information society development in this strategy are: 1. high level of Internet access 2. development of wide scope of e-services. Although the Strategy points to the need of raising general level of information availability, skills, inclusion of different social groups, it seems that social factors aren't sufficiently recognized and emphasized. These factors can often be decisive for spreading of ICT use, especially in categories of population that for some reason lag behind in relation to ICT use. Because of that, in this analysis we focus mainly on social aspects of women's ICT (non)use as a factor of increasing or decreasing quality of their life.

The concept of quality of life is a multidimensional phenomenon which can be analyzed from different angles³⁹. In this research study the concept of quality of life is defined as use of ICT for the purpose of satisfying individual needs in both private and business life. Based on that we defined the following indicators: 1. Factors that encourage/inhibit use of computer and the Internet, 2. Business use of computer and Internet, 3. Education through ICT, 4. Benefits of ICT use in everyday life, 5. Difficulties and problems in use of ICT.

³⁷ [15] Petrović, D. i Kovačević, I. (2012), *Nepoverenje kao prepreka razvoju e-trgovine u Srbiji*, Menadžment, Vol. 17(65):71-77

³⁸ Službeni glasnik, 2010

³⁹ Blažun, H. (2013) *Elderly People's Quality of Life with Information and Communication Technology (ICT): Toward a Model of Adaptation to ICT in Old Age*, University of Eastern Finland Faculty of Social Sciences and Business Studies

9.1. Analysis of interviews with computer users and non-users

Interviews are used for research of human behaviour, habits, experiences, motivation because they give in-depth look at socio-psychological mechanisms that are internal drivers of human actions and are hard to find by classical survey research. Computer and Internet use can be considered to be a social act which is mediated by many structural factors, but it is also a consequence of someone's decision to either engage or not engage. Because of that, it was important to interview women that are typical representatives of different ICT user groups and use the answers to better understand reasons and ways of computer and Internet (non)use in the context of quality of women's lives. Considering all above-mentioned facts, we selected ten female respondents representing different categories of ICT users, who had the following socio-demographic characteristics:

High-ranking manager in IT company, 40 years old, from Belgrade, university degree
Programmer in private company, 30 years old, from Belgrade, university degree
Programmer in state-owned company, 35 years old, from Belgrade, university degree
Employed woman who uses a computer, 30 years old, from Beška, university degree
Employed woman who uses a computer, 38 years old, from Barajevo, high school degree
Unemployed woman-engineer's degree, 28 years old, from Užice, university degree
Unemployed woman-engineer's degree, 25 years old, from Užice, university degree
Unemployed woman who doesn't use a computer, 53 years old, from Beška, high school degree
Pensioner who doesn't use a computer, 56 years old, from Ljubovija, high school degree
Pensioner who doesn't use a computer, 62 years old, from Beška, elementary school degree

9.1.1. Reasons for computer and Internet use

This section was split into two separate parts depending if we interviewed ICT users or non-users. In general, through this indicator we tried to examine deeper motivation of women for computer and Internet (non)use.

In this part of the interview, ICT users were asked questions about their experiences during a period of computer training, both for personal and business use, ways of ICT use, difficulties or satisfaction in relation to ICT use, etc. Use of personal computers (PC) in Serbia started to increase during second half on 1990s, so both first encounters with a computer and first experiences of our respondents were from that period. Depending on their age in the 1990s, some of them encountered a computer for the first time in their elementary school, while, on the other hand,

experiences of older respondents were from a later phase of their lives and usually related to their computer training or to the period when some of their children bought a computer and brought it in the house. All respondents said that they were more or less excited about their first encounter with a computer and none of them showed any kind of resistance or anxiety in relation to computer use. Respondents that got a computer during elementary or high school at the beginning used it for gaming and didn't spend much time on training for business use of computer. Later during their schooling, mostly during their faculty years, they became aware of the need for computer training since it could help them complete their work tasks.

When speaking on the subject of concrete reasons for computer use today, respondents stated that use of computer makes them feel more competent in comparison to persons who don't use computers and that computers give them various advantages in both private and business life. Characteristics of ICT use on both of these levels will be elaborated in detail in the analysis below.

It is interesting that in several interviews respondents stated that their first contact with a computer is related to a male figure in a family – father, brother or son. This combination of happiness related to first contact with a computer and male figure that brought it in the house can clearly be seen in the following two statements:

Unemployed woman (25): "My first contact (with a computer-*author's note*) was in the 6th grade of elementary school and I was so excited. I remember that I was sick, so I didn't go to school and **my brother** brought the computer home."

Unemployed woman (28): "Well, my first contact with a computer was when I was in the 4th grade. I remember **dad** bought that computer. It was like some kind of wonder machine to me and I simply didn't know how to act around it...I can only say that I was very excited and that I argued with my brother who gets the first go. It was a real wonder in our house."

These statements give a good illustration of the situation that is probably usual in most families in Serbia. Technical devices, or in this case computers, are brought into the household by men and as we already saw in previous analysis they are the ones that have greater IT knowledge compared to mothers. This is how models that men are more capable of using technical devices get transferred to children and young people and how they become stronger. One of our respondents also came to this conclusion when asked why in her company only men work on computer system maintenance jobs:

Programmer (35): "In my opinion, parents, when talking with children, present them this job as a "male" job, a job that requires physical labour, although it isn't completely true. On the other hand, maybe I just didn't come across women that are in to it (hardware – *author's note*)."

It the society in which almost all “mechanic” jobs are considered to be male jobs and technical devices are brought home and repaired mostly by men, it is hard to expect that boys and girls will be socialized in the same way in relation to IT use. It is likely to expect that male and female models of computer use will develop, meaning that most women will be more interested in computer applications, i.e. software, and most men, besides software, will be interested in hardware. In the context of our research, every computer use is better than non-use, but it would be bad to develop different gender models of ICT use in this domain. In that sense, young people should be educated on equal opportunities in relation to ICT use, which is one of the recommendations of this project.

9.1.2. Reasons for computer and Internet non-use

Interviews with computer non-users were conducted with an aim to find out motives behind their decision to not use ICT and potential factors that present structural barriers for ICT use. We were also interested if they ever attempted to get computer training and if yes, what hindered them from completing it – was it any certain material and infrastructural aspect or social aspect like prejudice on women’s ICT use.

According to data of Statistical Office of Republic of Serbia (hereinafter, SORS) for 2013, 40% of women in Serbia have never used a computer. As previous research studies show and as it was mentioned in the beginning of this analysis, women in our country that live in rural areas, that have lower than high school education, worse financial position and women older than 55 years use computer much less often⁴⁰. But, in order to understand why these women have never learned how to use a computer we need to take a look behind numbers and percentages. A series of interviews only with ICT non-users should be conducted in order to perform thorough analysis of these reasons which was impossible during this research study. Nevertheless, we managed to conduct interviews with three non-users from vulnerable ICT socio-demographic groups.

Two out of three women that we interviewed stated that they wanted to learn how to use a computer and that there were even free courses organized in their villages, but that it fell through at the end. Here is one of the statements:

Non-user (53): “I wished to learn how to use a computer. We have two computers, my daughters use them... People that went on computer training in Belgrade, promised us that they will teach us... I wasn’t the only one that signed up for the course. There were many women of my age that wanted to learn how to use a computer, but it was closed and I was disappointed... I was embittered too... but when, from who, who will teach me... my older daughters work, they have their problems – mom, I really can’t teach you now, you know that I’m in over my head.”

However, on the other hand, third user said that she never wanted to learn how to use a computer although members of her household use it:

⁴⁰ SORS, 2013; Petrović, D. (2013) Društenost u doba interneta, Akademska knjiga, Novi Sad

Non-user (56): “I was never interested in it, it seems like a waste of time to me... I sometimes think that I couldn’t learn it... My first thought is always that it would be a waste of time, considering how much it would take me to learn it. ... when I come into my sons room and see that he plays video games all day long it makes me sick... or my husband, playing cards on the computer... that’s the reason I don’t like it. I think that computer should be used for other things than that...”

Of course, we cannot make some significant conclusion based on such small sample consisting of just three respondents, but based on what we heard from them we can presume that there are two different categories of women that don’t use a computer. On the one hand, there are non-users that choose to be as such and that have no motivation in relation to ICT, and on the other hand, there are women that because of various structural factors (age, lack of money, education or bad infrastructure) never had an opportunity to learn how to use a computer, although they are highly motivated. Because of that, there are two ways to increase number of ICT users in these categories of women. First of all, women that want to learn how to use a computer should be offered a possibility to attend different types of free training, there should be computers at village educational centres that are available for free use, tele-centres should be organized etc. On the other hand, it will be much more complicated to develop motivation of women that aren’t aware of possibilities of ICT use. One of possible and basic ways is conducting campaign with an aim to raise awareness on potential benefits of computer and Internet use. Our interviews show that respondents that have clear awareness of benefits of computer use are the ones that are most highly motivated to learn, which can be seen in the following statement:

Non-user (53): “You can use a computer or the Internet to find a job, you can send e-mail, I’m not employed, my husband isn’t employed, you can do a lot of things... if I have a cottage industry, I produce something, as I already do, I’m crocheting, knitting, I can find other people’s work and use it, and sell it or I could put my products on for sale there, but I can’t do it, that’s really regrettable.”

9.1.3. Business use of computer and Internet

We used this indicator to find out in which way ICT use can make performing of a job easier or possibly harder. We were also interested in ways in which ICT is used for collecting business information outside of usual job tasks and responsibilities. This refers to establishment of new contacts on the Internet, collecting resources over the Internet such as information, education material and various documents.

Women that don’t use computers and unemployed women didn’t answer to this question, so we were limited to only five respondents. From these interviews we found out that for higher positions in the company’s hierarchy, i.e. positions that require higher level of IT expertise, employers set higher requirements in relation to computer skills. Two respondents that don’t work in IT sector said that computer skills weren’t required when they were employed, although today computer is practically their essential tool for work and they use it all the time. Some respondents even stated that they sometime receive and send up to 100 e-mails daily, which shows that computer use leads

to very intensive communication. However, most of our respondents are able to finish their work during working hours, which is surprising since informatization of work led to blurring of the line between work time and free time⁴¹. But for persons that hold high-ranked positions in business hierarchy, like one of our respondents (IT manager), that line completely disappears. She answered to our question with a counter-question – “Free time? What is that?” Not only she, but other women working as programmers have to take their work home more or less often.

Question that was especially important from the standpoint of this project is about possibility of establishing new business contact on the Internet. Internet offered a possibility to expand business networks, especially in relation to contacts that would otherwise be unreachable. In that way, Internet helps bridging structural gaps that more or less limit every individual. Persons that bridge these gaps more easily than others become network brokers and have larger social capital⁴². Unfortunately, most of our respondents don't use the Internet for establishment of new business contacts, although it can be very helpful. Only respondent that clearly recognizes potential benefits of this type of Internet use is high-ranked IT manager. When asked if she uses the Internet to find new business contacts, she stated the following:

IT Manager (40): “We do that all the time... I often take part in some forums or discussions, and it happens sometime that I connect with someone from the company, who works in some other country, because our company is present in 13 countries... So we weren't connected by the company, but for example I look for people on LinkedIn, than I found out in which sector they work, and then we connect. It is much easier to connect since we work for the same company, that small barrier has been removed, we have some feeling of togetherness ...”

Previous research studies show that women form new relationships on the Internet less often than men⁴³. That can be a consequence of transfer, from real to virtual space, of traditional sociability patterns which imply that men are supposed to initiate new contacts. Obviously some women transfer this model to business environment, although it should function differently. Because of that, training programmes for employed women should be organized and women should be trained to use the Internet to successfully find new business contacts that are hard or impossible to reach by traditional channels of communication.

9.1.4. Education through ICT

Through this indicator we examined how our respondents were trained for ICT use and how did they use these technologies for further education and specialization. This refers to both formal education, i.e. additional training, and self-education, i.e. finding educational content on the Internet, signing up for online courses etc.

⁴¹ Eriksen, T. H. (2003) *Tiranija trenutka*, Biblioteka XX vek, Beograd

⁴² Burt, R. (2002) *The Social Capital of Structural Holes*, in: Guillen, M., Collins, R., England, P. and Meyer, M. eds., *The New Economic Sociology*, Russel Sage Foundation, New York

⁴³ Petrović, D. (2008) *U međumrežju-internet i novi obrasci društvenosti*, ISI&SF, Beograd; Petrović, D. (2013) *Društvenost u doba interneta*, Akademska knjiga, Novi Sad

Most of our respondents completed basic computer training as a part of their high-school education, since in mid 1990s high schools in Serbia introduced compulsory subject called Computer Science and Informatics⁴⁴. Only two older respondents learned how to use a computer through training courses, because mass use of personal computers in Serbia started after they completed their formal education.

Respondents have different experiences with their high school education. It ranges from learning really advanced programmes to practicing only trivial things, as it can be seen in the following statements:

Programmer (35): “I did more serious programming in *Pascal* during my high school than in the faculty... Far more serious... Our faculty teacher was young and fresh out of the School of Electrical Engineering in Belgrade. She used to explain us signals, digitalization, *Pascal*, she made us draw and explain algorithms, write programming language...

Unemployed woman (28): “We didn’t do anything in high school during those classes. We practiced using computer mouse, played minesweeper and did nothing in particular for two hours... We literally didn’t do anything. Then, during my faculty I realized that I didn’t know anything so I started learning how to use *Word*, because I needed it, then I had to learn how to use *Excel*...”

It seems that lack of teacher’s enthusiasm and desire to pass the knowledge are more of an issue than poor systematic organization of classes from this subject. The fact that today’s young people are surrounded by technology can present a problem for teachers. By the time young people reach high school they probably already have advanced knowledge and modern computer equipment and classical education can be boring to them. And if you take into account a certain number of teachers that don’t modernize their work methods and teaching material this can become a big problem, since this area is very dynamic and innovations are being presented every year. It is important to mention infrastructural issues like availability of computer equipment and Internet connection without which classes can’t be successfully performed.

We find it encouraging that when it comes to business use of Internet almost all respondents recognize that Internet is an important source for finding materials that can be used for performing a job or for personal development. Statement of unemployed women from Užice is an illustrative example of personal development:

⁴⁴ Klem, N. (1998) Nastava računarstva i informatike u gimnazijama, Predavanje na Republičkom seminaru o nastavi matematike i računarstva, Beograd, preuzeto sa:
<http://elib.mi.sanu.ac.rs/files/journals/nm/211/nm431207.pdf>

Unemployed woman (25): “I use the Internet for personal education, I find certain content about programming, computers etc, because I think it would be nice to improve in this area. Being unemployed gives me more time to educate myself even further, I find it very interesting.”

Employed women use the Internet to educate themselves as a part of their work activities, which can be seen in the following statements:

IT Manager (40): “(answering if she uses the Internet for educational purposes during her work – *author’s note*) Of course I do...In my previous term I was responsible for training of all people working in Internet sales, so we had to develop tools. We did it as a part of *Knowledge management* and I was really interested in it.”

Employed woman (38): “It is impossible to get the job done without it (the Internet –*author’s note*), there is always some regulation to read or my superiors ask me to find something in, for example, Official Gazette, Journal, Law, etc”

So, importance of business use of the Internet is recognized by all our respondents and it is very probable that vast majority of employed women in Serbia share this view. However, there is a long way from recognizing usefulness to successful use of the Internet for more efficient performance of work tasks. These skills should be constantly improved through special training and workshops that would point out potential business and educational use of the Internet.

9.1.5. Benefits of ICT use in everyday life

Through this indicator we examined to which extent, in the opinion of our respondents, ICT use improved the quality of their lives. It mainly refers to use of ICT for non-business purposes, i.e. for getting various information, making online purchases, travel organizing, maintaining social contacts, etc.

Generally speaking, all women that we interviewed recognize the benefits of computer and Internet use for improving their quality of life. Primarily, they feel confident because they have a skill that almost half of women in Serbia don’t possess. They note that the Internet makes their life easier. This is, of course, usually noted by women that have careers in IT or hold high-ranking managerial positions, since, on the one hand, they spend most of their time on the computer and, on the other hand, their careers are more demanding and take away a lot of their free time. Here are some very illustrative statements:

IT Manager (40): “It (the Internet – *author’s note*) absolutely saves me time... first of all, I pay all my bills over the Internet, so it means I don’t have to stand in line for hours... I even pay my father’s bills over the Internet. I usually schedule meetings over the Internet... I shopped over the Internet even few years ago when nobody else used to do it, through Maxi online service. I ordered through it and it went out perfectly. “

Programmer (35): “It (the Internet – *author’s note*) saves me a lot of time, I can give you thousand of examples... e-banking, or when I’m looking for a book, which bookstore has the lowest prices and everything else... Not only books, anything... every aspect of my everyday life that I can think of is easier thanks to a computer.”

It is interesting that when they are not at work our respondents don’t spend too much time on the computer, about 2 hours on average. They usually use it for contacting friends and relatives, but also for relaxation on online social networks, like Facebook.

9.1.6. Difficulties and problems in use of ICT

Through this indicator we expected to get respondents’ opinion on problems that women face while using ICT. We also asked respondents to describe their personal experiences (fears, expectations, surprises) and observations in relation to ICT use, both for private and business purposes. We were especially interested in gender discrimination issues during the period of computer training.

Most of our respondents mentioned physical discomfort and health problems. They stated that working at a computer makes them feel tired, they feel less active and sometimes have health problems like back pain or eye pain.

It is worrying that some of our respondents feel that computer and Internet use separates them from their families. Here is one illustrative statement:

Unemployed woman (28): “I have a morning ritual. I visit Facebook, play some of my games while drinking morning coffee. And although my brother is literally in the same room, I realized that I never asked him to have a coffee with me in the living room... It is my ritual and I simply want to be left alone... that’s when I realized it (that computer separates her from her family – *author’s note*). it literally pulls me in, and I don’t know why... maybe I’m an addict.”

This problem is often pointed out in the media. According to most previous research studies, there is no evidence that moderate computer and Internet use can have any negative social consequences⁴⁵, but there should be a certain amount of caution in relation to this aspect of ICT use. ICT use isn’t the most common reason for losing touch with other people. Contact with people is more often lost because of large number of business responsibilities, work being taken home and

⁴⁵ Petrović, D. (2013) Društvenost u doba interneta, Akademska knjiga, Novi Sad

fast pace of life. When asked if she would see her close friends more often if she spent less time using ICT, one of our respondents said the following:

IT Manager (40): “We’re so busy and I doubt that we could see each other more often. For example, my close friend is „offline“, she doesn’t have Facebook account or anything similar. I literally try to force her to install Gtalk, but she refuses. And one other friend of mine is „online“. They were both my good friends, but now I have more contact with one of them because she uses these tools and the other one doesn’t...”

Most important problem that was pointed out by some respondents is gender discrimination they faced during ICT use. Respondents that studied on technical faculties had especially negative experiences, which can be seen in the following examples:

Unemployed woman (25): “I didn’t face any prejudice in high school, but I did face some later - in the faculty. I met few assistants that underestimated girls and women that wanted to learn programming... During exam in Computer Networks, there were two groups of three students each. I was in a group with all girls and there were one guy and two girls in the other group. We had same topic, and since we all knew each other, we came to get some directions about our work. Assistant spent all the time talking to that guy and didn’t even pay attention to two girls who were also in that group ...(and then he said to my group –*author’s note*) – “And you three are on your own? OK, just do the most basic stuff!”

Unemployed woman (28): “Of course I faced it (prejudice – *author’s note*), especially on Faculty of Mechanical Engineering...For example, in my first year of studies we had programming course, computer tools etc...My male friend and I gave the same answers, absolutely identical, we knew everything and he (professor – *author’s note*) came up to my friend and said OK, you did great and gave him the highest grade. Then he came up to me and told me that I didn’t have a clue what I was talking about, what was I thinking enrolling in the faculty, faculty of mechanical engineering is no place for a woman... Then it started happening more frequently. There were professors that simply harassed female students, (in their opinion) faculty of mechanical engineering was no place for a woman and they would never have the same knowledge as men....an there was one professor in the third year of faculty that used to say that employers wouldn’t entrust us with a project, simply because we are women, and that they would rather give it to a man, because women are clumsy, or something like that...the amount of discrimination I faced on faculty of mechanical engineering was simply horrible!

It is interesting that older respondents, who acquired their knowledge through computer courses in later phases of their lives don’t share these experiences. It is possibly because the purpose of these courses is the help participants gain basic computer skills and to make them informatically literate. Since participants of these courses have the same amount of knowledge or lack of it, there

isn't much space for prejudice and gender discrimination. Also, these courses are usually paid for and it is not in teacher's interest to harass participants since it would be a bad publicity and they would probably get fired. On the other hand, faculties generally encourage competitive spirit, which is usually based on different levels of prior knowledge and capacity of students, but obviously it isn't immune to some discriminatory factors. In addition to that, on technical faculties, which were almost exclusively men's domain when they were founded, there is still some kind of distrust in women being able to acquire engineering degree. Of course, we can't claim that this is a dominant situation in all technical faculties in Serbia, but even if it happens only in few faculties or colleges or if only small number of professors and assistants have this kind of attitude, than it is a worrying phenomenon which should receive more attention.

Finally, we will note one more potentially problematic aspect of ICT use. It is privacy protection of users of this technology. Massive use of ICT and high flow of information provided by it brought with them various dangers in relation to misuse of data transferred in that way. Many internet privacy protection guidelines and manuals that have been adopted by various regulatory bodies all around the world show that this fear isn't unfounded⁴⁶. This is also confirmed by various public protests, different petitions and formal complaints regarding invasion of privacy which were filed by users against some of the most popular social networking sites. Because of potentially high level of danger that internet protection privacy issue brings with it, it is a subject of many research studies, discussions and there are many recommendations regarding this issue coming from general public, users, scientists, governmental and non-governmental organizations. The reason for such a high interest in this issue is exponential growth of number of people who, more or less, voluntarily share information which have different levels of confidentiality. The fact that information stored on the Internet can be there forever, which makes them available to different individuals or interested groups and organization, is very worrying. Besides that, information that is released online transfers almost instantaneously and becomes globally available to everyone. Additional problem is that ICT users voluntarily leave their personal information (name, surname, addresses, phone numbers, photos, etc), usually giving little thought to consequences of their act. For example, research study conducted by Gross and Acquisti⁴⁷ shows that 82% of active Facebook users reveal their personal information like, date of birth, cell phone number, address, political and sexual orientation, name of their partner. Young and Quan-Hasse⁴⁸ got similar results when they conducted a research study on behaviour of students in Canada.

Providers of these services create an illusion of absolute safety which encourages users to reveal their personal data. In addition to that, default settings on social networking sites are usually such

⁴⁶ ENISA (2012) Privacy considerations of online behavioural tracking, <http://www.enisa.europa.eu/activities/identity-and-trust/library/deliverables/privacy-considerations-of-online-behavioural-tracking>

⁴⁷ Gross R. and Acquisti A. (2005), Information revelation and Privacy in Online Social Networks, ACM workshop on Privacy in the electronic society, Alexandria, VA, USA

⁴⁸ Young A. L and Quan-Hasse A (2009), Information revelation and internet privacy concerns on social network sites: a case study of face book, Fourth international conference on Communities and technologies, University Park, Pa, USA.

that data is public and available to everyone, unless these settings are changed by the user. This means that information is available not only to friends, but to other users of a social network and to other Internet users as well.

Security and privacy threats for women using ICT is usually a consequence of lower level of computer literacy in comparison to men (see results of our field research). In these circumstances female ICT users are more vulnerable and more often misused since they are less capable to react adequately or in some case they don't even recognize Internet threats. This especially applies for misuses that take place on social networking platforms used by large number of women, which our respondents confirmed in their interviews.

9.2. Conclusion

ICT revolution opened vast space for improvement of people's quality of life at the beginning of 21st century. According to Castells⁴⁹ the question of networking/non-networking in the present day becomes a question of life and death, metaphorically speaking. It means that social groups which for various reasons don't use new ICT or which have low level of computer literacy are in much worse position compared to those having better ICT skills. Our study shows that women can be classified in vulnerable group of ICT users. It is less the issue of availability of these technologies than low level of women's computer literacy.

Our research shows that women who don't use a computer can be classified in two general groups. On the one hand, there are women who have no motivation in relation to ICT use, meaning that they don't express a desire to use ICT and don't recognize the purpose of ICT use. On the other hand, there are women that because of various structural factors (age, lack of money, education or bad infrastructure) never had an opportunity to learn how to use a computer, although they are highly motivated.

Women that use a computer and the Internet can also be classified in two groups. On the one hand, there are women who use ICT proactively and successfully use computers for improvement of quality of both business and private life. On the other hand, some female users aren't too creative in relation to ICT use, they perform their regular tasks, but don't use ICT to find new business opportunities or to make their everyday life easier.

Interviews with female ICT users show that computer is usually brought into the household by male persons and men are usually the ones responsible for computer maintenance and repairs, which further strengthens the belief that ICT use is primarily a part of men's domain. In addition to that, analysis of ICT value patterns showed that both men and women support the attitude that man is the one that should monitor children's computer use.

Interviews we conducted show that women are discriminated by men in the context of ICT use. Our respondents noted that there is an especially high level of discrimination in technical faculties in Serbia. It seems that a number of professors, assistants and even colleagues still think that technical faculty is men's "natural environment" and that women are some kind of intruders, since they don't have "predispositions" for engineering jobs. Of course, we can't claim that women in Serbia

⁴⁹ Castells, M. (1996) *The Rise of Network Society*, Blackwell Publishers, USA

systematically face gender discrimination in technical faculties, but there are obviously some deep-rooted value models that still persist.

10. FINAL CONCLUSIONS AND RECOMMENDATIONS

Research results derived from data collected during field surveys, statistical data analysis, responses of institutions and all other activities of the project on the role of ICT skills in the context of women's labor market situation, resulted with recommendations presented in this chapter. The results of this study have shown that women can be classified as a vulnerable group when it comes to the ICT use. Therefore it is necessary to take a number of actions in order to improve their status in business and everyday life. These recommendations are intended as an aid for campaigns conducting and also as guidelines for government and local institutions, the National Employment Service, educational institutions and companies. The principal aim is to achieve more efficient and equitable participation of women in the ICT sector and their easier and faster integration in the Information society.

➤ Recommendations for campaigns

1. Conduct a campaign in cooperation with Gender Equality Directorate with an aim to raise awareness on gender equality in ICT use, i.e. to remove stereotypes that women are less competent and less capable to use ICT or work in IT sector.
2. Conduct a campaign in cooperation with Gender Equality Directorate with an aim to raise awareness on possibilities of improving quality of women's life as a result of ICT use.
3. Conduct a campaign in cooperation with Gender Equality Directorate with an aim to popularize faculties of natural and technical sciences among young women, with an emphasis on IT sciences.
4. Organize workshops, seminars, professional education of children and youth in cooperation with Gender Equality directorate with an aim to

➤ **Recommendations for state institutions**

1. Integrate gender equality principle in legal and regulatory framework concerning ICT, and especially in documents related to safety and security issues of ICT use.
2. Development of strategies and branch policies in the field of ICT must be viewed from the perspective of gender equality and their impact on lives of women.
3. Action plans for implementation of Strategy for Information Society Development by 2020 should be gender-sensitive and the need for creating of services that will improve life of women should be emphasised.
4. Respect the principle of equal representation of men and women when selecting members of a team for development of strategies and branch policies in the field of ICT.

➤ **Recommendations for local government**

1. Organize free trainings in computer and internet use for women that during their schooling didn't have any formal computer training, with an emphasis on women over 50 years old, within local government units, local communities, work organizations, associations and continually monitor their work.
2. Organize free trainings in computer and internet use for rural women within local government units, local communities, rural centres, various associations and continually monitor their implementation.
3. Organize and form a network of ICT assistance centres for rural women with a possibility of free computer and internet use and continually monitor their work.

➤ **Recommendations for National Employment Service**

1. Organize free trainings on using computer and internet for business purposes for unemployed women in subsidies of National Employment Service with an aim to increase their chances on labour market.
2. Establish mechanisms for tracking employment outcomes of male/female engineering graduates and track if their first employment is in accordance with their professional qualification.

➤ **Recommendations for educational institutions**

1. Modernize programmes and methods of compulsory computer education for children in primary and secondary schools.
2. Schools and faculties should keep gender information in their databases, so that data regarding gender equality could be tracked.

➤ **Recommendations for companies**

1. Organize free trainings on business/advanced computer and internet use for employed women within work organizations.
2. Take into account equal representation of men and women when conducting projects in ICT sector.

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APPENDIX 1: QUESTIONNAIRE

<p>1. Gender</p> <ol style="list-style-type: none"> 1. Male 2. Female <p>2. Age – year of birth _____</p> <p>3. Place of residence _____</p> <p>4. Occupation</p> <ol style="list-style-type: none"> 1. Pupil or student 2. Full time employee 3. Part time employee 4. Self-employed 5. Unemployed 6. Pensioner 7. Housewife 8. Other <p>5. Education</p> <ol style="list-style-type: none"> 1. No education 2. Primary school degree 3. Secondary school degree 4. Higher education degree <p>6. Monthly income of your household in euro</p> <ol style="list-style-type: none"> 1. Below 300 2. 300-600 3. 600-1000 4. 1000-1500 5. above 1500 <p>7. Do you use a computer?</p> <ol style="list-style-type: none"> 1. Yes, every day 2. Yes, more than once a week 3. Yes, once a week 4. Yes, a few times a month 5. Once a month or less 6. I don't use a computer <p>8. Do you use the Internet?</p> <ol style="list-style-type: none"> 1. Yes, every day 2. Yes, several times a week 3. Yes, once a week 4. Yes, a few times a month 5. Once a month or less 6. I do not use Internet 	<p>9. Does your household have a computer?</p> <ol style="list-style-type: none"> 1. Yes, we have a computer (laptop, notebook, etc.) 2. Yes, we have more than one computer 3. We do not own a computer <p>10. Does your household have an internet connection?</p> <ol style="list-style-type: none"> 1. DSL (ADSL) 2. Wired internet (optical cable, PLC) 3. Wireless connection (satellite Internet, public WiFi) 4. Dial-up access via a telephone line or ISDN 5. My household is not connected to the internet <p>11. Why you do not have Internet access at home (more than one answer is allowed) ?</p> <ol style="list-style-type: none"> 1. I have access to Internet elsewhere 2. No need for Internet 3. The equipment is too expensive 4. Internet access is too expensive 5. I do not know how to use internet 6. I think it is not safe to use the Internet 7. There is no possibility of connecting to the internet 8. None of the above, the other reasons <p>12. Which computer activities are already carried out (more than one answer is allowed)</p> <ol style="list-style-type: none"> 1. Using internet search engines (Google, Yahoo) 2. Sending e-mails with attachments (documents, pictures) 3. Using the copy and paste function in Word or similar programs 4. Creating tables in Excel or similar programs 5. Create electronic presentations in PowerPoint or similar programs 6. Compressing (Zipping) files 7. Connecting and installing new devices (e.g. modem) 8. Writing a computer program using special programming languages 9. Transferring files between computers and other devices (mobile phone, MP3 player ...) 10. Installing a new or replacing old operating system 11. None of the above <p>13. Do you feel you need additional training for computer work (can multiple responses)</p> <ol style="list-style-type: none"> 1. I do not need additional training 2. Microsoft Office (Word, Excel, Power Point) 3. Better internet browsing 4. Web designing 5. Something else
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14. Do you use a computer and the internet at work?

1. Yes, these are basic resources for my work
2. I use them every day
3. I often use them
4. I use them sometimes
5. I rarely use them
6. My job is not related to computer use

15. Do you have additional jobs that requires computer skills?

1. Yes, often
2. Yes, sometimes
3. Yes, but rarely
4. Never

16. What activities for private purposes did you carried out over the Internet, in the last 3 months: (more than one answer is allowed)

1. Sending / receiving e-mails
2. Participation in social networks (Facebook, Twitter)
3. Read or download online newspapers / magazines
4. Search for to health related information
5. Search for education,/training related information
6. Finding information about goods and services
7. Download software
8. Attending an online course (in any field)
9. Searching for a job or sending a job application
10. Participation in professional networks (creating profiles, messaging)
11. Using services related to travel and accommodation
12. Selling goods or services over the Internet (e.g. via auctions)
13. Internet payment
14. Games of chance (e.g., on-line betting)

17. What were the problems you encountered during internet and computer use (more than one answer is allowed)?

1. Connection problems
2. Not knowing the language
3. Material costs
4. Lack of knowledge and skills
5. Viruses
6. Harassment by strangers
7. Other

18. This question relates to the contacts you have made via the Internet. Mark each type of contact that you made via the internet, at least once:

1. To connect with organizations or groups that I am a member of
2. To connect with people from whom I can get new information
3. To connect with people of different generations
4. To connect with people from different ethnic backgrounds
5. To connect with people of different economic status
6. To connect with people of various occupations
7. To find new business opportunities
8. To find people or groups that share my interests, beliefs, religion or national origin

19. Evaluate claims in the table below, using score from 1 to 5, where score 1 means that you strongly disagree with the above statement, while the score 5 means that you strongly agree with the given statement.

Claim	Score
Women and men can be equally good programmers	12345
Men are better in learning computer skills	12345
After all, men are better with computer technology and the women with housework	12345
It is easier to deceive (abuse) woman than a man on the internet	12345
I feel safer if my computer is installed (repaired) by man	12345
Women are only able to use the computer for gossiping on the Facebook	12345
Male brain is better adapted to the use of computers than female brain	12345
It is not natural for a woman to be a hacker	12345
The man is the one who should monitor computer use by children in the family	12345
If I had a company I would rather have a man than a woman to maintain my computer equipment	12345

20. Do you know a women who is an expert for computer use:

1. Yes, I know more than one
2. Yes, I know one
3. I'm not familiar with that

APPENDIX 2. INTERVIEW GUIDE

My name is_____. We are conducting research on the role of ICT-related knowledge and women's labour market situation. Your opinion as user (non-user) of ICT is crucial for the realization of this research as well as for recommendations that will arise as a result of this research. We would really appreciate if you have some free time to spare for this interview. All the information gathered from our conversation will be anonymous and used only for the purposes of this research, and therefore we ask you to be open and free to share with us your experiences related to (non) use of ICT. If you do not mind I would like to record this interview in order to prevent losing important details of our conversation.

I For the beginning, would you mind telling us something about you.

1. How old are you?
2. How long have you lived in the current place of residence?
3. What level of education do you have?
4. With whom do you currently live?
5. How would you describe the financial situation of your family?
6. If you are employed, how long have you been working in the current workplace?

Note: If respondent does not use a computer go directly to the block IIb and afterwards finish the interview.

IIa Can we please turn to your computer literacy?

1. When did you meet with the computer for the first time, describe to me how did you feel?
2. How would you describe your level of computer literacy?
3. How did you learn to work on the computer?
4. What are your experiences of this period? Have you been worried how will you learn to work on the computer?
5. During this period have you been faced with some prejudice that women are not able to learn to work on the computer? If that was the case, by whom those prejudices had been expressed?
6. Do you have a personal computer and when did you buy it for the first time?
7. For what purpose you had used the computer at a beginning?
8. Have you had a break in the computer usage?

IIb Can we now discuss your reasons for not using a computer?

1. Have you ever wanted to learn how to use a computer?
2. If that was the case, what had prevented you from pursuing your wish?

3. If that isn't a case, why is that (lack of motivation, money, fear, low education...)?
4. Was your environment (dis) encouraging for learning how to use a computer?
5. If you would know how to use a computer for which purpose you would use it?
6. If there was free of charge computer training, would you sign up?
7. What would you do if someone gave you a computer for free?

III Can we now discuss your business use of a computer?

1. Was computer knowledge one of the requested skills when you applied for your job?
2. What amount of time, you spend using computer on the daily basis for business purposes?
3. Would it be possible to carry out your work without the computers and the Internet?
4. Approximately how many business e-mails you receive and send per day?
5. Have you gained some new business contacts thanks to the Internet?
6. Do you use computer for business purposes in your leisure time?

IV Can we now discuss your educational use of a computer?

1. Have you finished some computer literacy course and what did you learn?
2. Have you used a computer for any kind of education related to your job?
3. Did your employer organize some kind of computer training?
4. Do you use the internet to search for educational materials related to your job?

V Can we now discuss how use of a computer affect the quality of your life?

1. How long do you use a computer?
2. What amount of time you spend using computer on the daily basis, not counting business activities?
3. Do you have the impression that the use of computer keeps you away from your family and friends?
4. Do you have the impression that computer use saves you time for various time-consuming activities (shopping, banking, searching some advice, communicating with family and friends)?
5. Do you think that the computer skills you have, make you a more competent person in general?

VI For the end, can you in your personal experience evaluate pros and cons of computer use?

1. The most important pros?
2. The most important cons?

APPENDIX 3. GENERAL INFORMATION FOR SURVEYED COUNTRIES

In this Appendix the general demographic data is presented for the following countries that have been selected as exemplary: Poland and Finland, as two EU Member States, and Croatia and Slovenia, as countries from the region, but also the EU member states.

Each country participating in the comparison is presented with particular emphasis on:

- Women in the labor market
- Women with part-time job
- Student of colleges and high school

SERBIA

General information

Capital population
Belgrade (1 639 505)

Area (km²)
88 361

Total population
7 186 862

Population density (per km²)
92



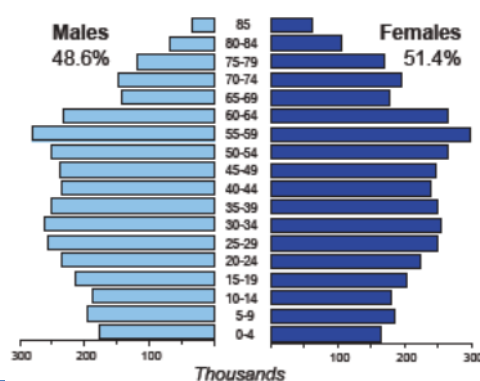
Women in the labor force, 2010 45%
Percentage of total for both sexes

Women in part-time employment, 2010 10%
Percentage of total of women employed

Female tertiary students, 2009 55%
Percentage of total for both sexes

Women researchers, 2009 47%
Percentage of total for both sexes

Population by age, 2011



FINLAND

General information

Capital population Helsinki (595 384)

Area (km²) 338 150

Total population 5 388 272

Population density (per km²) 16



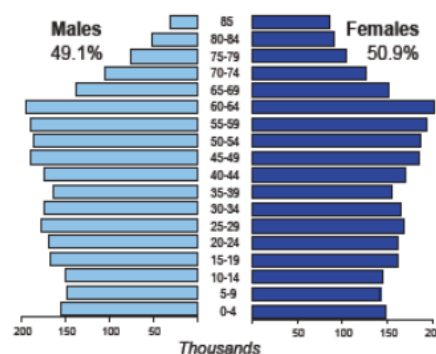
Women in the labor force, 2011 48%
Percentage of total for both sexes

Women in part-time employment, 2011 20%
Percentage of total of women employed

Female tertiary students, 2009 54%
Percentage of total for both sexes

Women researchers, 2009 31%
Percentage of total for both sexes

Population by age, 2011



On the Finnish political scene two main persons are female, the president and prime minister, and even 11 of 20 ministers are women. Even 43% of the Finnish parliamentarians are women. The strategy to achieve all of the United Nations Millennium Development Goals (adopted by all UN member states in 2000) is to promote gender equality and to empower women but due to the feminization of poverty, investing in women and girls. Finland was the first country in the world to extend universal suffrage and the right to stand for elections to all women and met – it did so in 1906.

SLOVENIJA

General information

Capital population	Ljubljana (272 554)
Area (km ²)	20 253
Total population	2 052 843
Population density (per km ²)	101



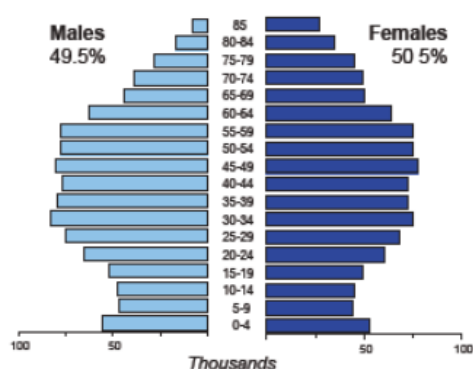
Women in the labor force, 2011	46%
Percentage of total for both sexes	

Women in part-time employment, 2011	13%
Percentage of total of women employed	

Female tertiary students, 2009	58%
Percentage of total for both sexes	

Women researchers, 2009	36%
Percentage of total for both sexes	

Population by age, 2011



Slovenia has made good progress in gender equality, with legislation in place to protect and promote women's rights and participation in the workplace and in political life. However, the legislation appears to have limited impact on the conditions for women to date, with women count less than 1/3 of all managers, senior officials, and low political representation.

POLAND

General information

Capital population Warsaw (1 710 130)

Area (km²) 312 685

Total population 38 534 157

Population density (per km²) 123



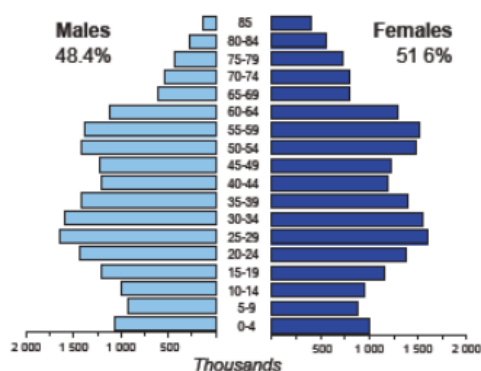
Women in the labor force, 2011 45%
Percentage of total for both sexes

Women in part-time employment, 2011 11%
Percentage of total of women employed

Female tertiary students, 2009 59%
Percentage of total for both sexes

Women researchers, 2009 40%
Percentage of total for both sexes

Population by age, 2011



The situation of women employed in ICT sector in Poland is quite specific. Poland has been an EU member state since May 2004, but unfortunately until today the working conditions of women in ICT and mostly their wages are not in line with those available to workers in other, in particular „old” EU states.

CROATIA

General information

Capital population Zagreb (1 710 130)

Area (km²) 56 542

Total population 4 405 144

Population density (per km²) 78



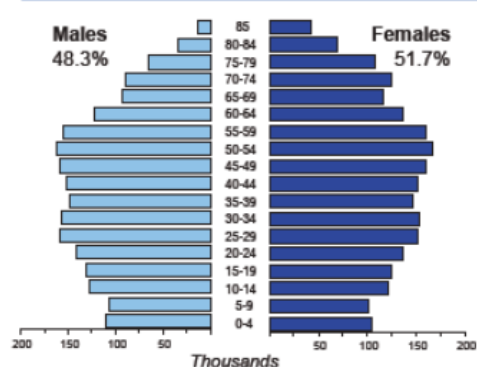
Women in the labor force, 2011 **45%**
Percentage of total for both sexes

Women in part-time employment, 2011 **12%**
Percentage of total of women employed

Female tertiary students, 2009 **60%**
Percentage of total for both sexes

Women researchers, 2009 **46%**
Percentage of total for both sexes

Population by age, 2010



The ICT sector in Croatia employed 34% of the women, of whom 64% are from 31 to 50 years, while 28% of women are in management positions. The results of research on women's participation in the Croatian ICT sector shows that the most common barrier to more active participation of women is the perception that these occupations are traditionally male.

APPENDIX 4: BEST PRACTICE EXAMPLES OF ICT KNOWLEDGE IMPACT ON WOMEN LABOR MARKET

MOTOROLA POLAND – BEST PRACTICE IN EDUCATION

In terms of employment, Motorola Poland is a good example of a company which has designed a project to engage girls within the ICT sector. The Diversity Project aims to show girls that science and computing do not have to be male-driven and can be whatever one makes of it. It has the added value of boosting girls' confidence in their ICT skills.

Their general goal in terms of education is to support the "creation of interest in ICT areas in secondary schools". The Diversity Project was first run in 2000 and initially it had a limited scope, designed only for four high schools. 120 students participated in this first edition. Six years later, it had extended to the whole of Poland, with over 2000 pupils competing in the programme. High school students wishing to enter had to be aged between 12-16 years old and to form teams of 4-6 members.

The most crucial condition for the project to achieve its main goal of promoting girls' interest in ICT was the 50% rule. At least half of the teams' members had to be female students. This rule has positively shifted the participants' characteristics overtime: in 2001 only 34.6% of participants were girls, whereas in 2006 they had become the majority at 56%.

Another important change made to the programme over the years was the launching of the project online. Initially, the project encountered some obstacles concerning mostly myths and stereotypes over girls' inability to engage in ICT-related competitions. Teachers rejected the project due to its specifically stipulating the participation of girls, seen as a nonsensical rule. There was a lack of effort to motivate female students to participate in the project. When the competition was launched online in 2003, the percentage of girls participating increased by 10 percentage points (43.4% in 2002 to 55.3% in 2003).

The outcome of the Diversity Project has been very positive. Its goal of attracting women into ICT-related studies has worked in two ways: it has shown female students that computer technology is what someone makes of it and it can actually be appealing to girls; and by promoting girls' participation in the programme, the Diversity Project has helped to dispel myths and stereotypes on girls' abilities to work with computers and helped to shape a motivating environment for young women to pursue computer science studies.

Three main characteristics of this project have been found to be the core of its success:

- the **age** of the participants: targeted to pupils between the ages of 12 and 16 years old, the programme acts exactly in the moment when students are deciding their future;
- **technical knowledge not required**: students do not have to have computer knowledge a priori, they are free to use their creativity;
- **larger impact**: the benefits of the programme are not just attracting girl students to computer science degrees; even students who do not choose to pursue a career in ICT are nonetheless enriched with computer skills.

TELIA SONERA, FINSKA – BEST PRACTICE IN CAREER DEVELOPMENT

In terms of career development, Telia Sonera, a leading Finnish telecommunications company, was highlighted by the European Commission as an example of best practice. Its managerial

programme aims to assess employees in their leadership skills, putting a special emphasis in equality of opportunities and on gender balance. Through the participation in this programme, female employees realise their potential in management and might be encouraged to apply for promotions to managerial positions.

The phenomenon of the "leaky pipeline", i.e. mid-career female employees dropping out of their ICT-sector careers, is testimony of the de-motivation of women caused by little career progress, a male-dominated environment and the difficulty to reconcile a job in ICT with parenthood and other care responsibilities.

The GO-program for career development of Telia Sonera is designed to improve the chances of female workers in particular to progress to managerial positions within the company. Telia Sonera has a history of public-sector ownership with a culture of strict rules in terms of gender equality, in itself a very extensive practice in Finland. The GO-program stems from the company's explicit objective of providing equal career advancement opportunities for both women and men and thus having a balanced presence of both genders in all positions. The specific goal of the GO-program is to guarantee that the best and most qualified employees have the access to managerial positions. Women are encouraged to apply, as purposeful attention is given to equal participation. The results have been very positive as the company has seen a rise in the number of female managers, both in technical as well as service-oriented departments.

The programme consists of three different phases:

- the Kick-off phase: where individuals are required to assess themselves (e.g. how do they see themselves, what are their strengths and weaknesses, their reactions towards new work, their way of developing projects);
- the Professional-growth phase: employees are assessed by external psychologists, in order to be given objective advice and for the candidate to be able to plan their future career;
- the Leadership assessment centre: in this last phase, candidates work in teams. They are given individual tasks and are afterwards assessed by their peers based on their behaviour and work. At the end, employees receive a career development plan based on the results of the different phases of the programme. A follow-up on each candidate is conducted in order to monitor the changes that occurred after the participation in the programme and thus to assess how effective it is.

The increase in the number of women in managerial positions in Telia Sonera since the start of the programme in 2003 has been related to the positive effects of the GOprogramme. Explanations for the effectiveness of the GO-program can be summed up as follows:

- it boosts women's self-confidence;
- it gives female employees a clearer view of their abilities and their expectations;
- through different assessment channels, the Human Resources department is given an objective report on an employee's motivations, abilities and whether that person is working in a position in line with their potential. It is shown that this creates new opportunities for women to accede higher posts.

WORLD WIDE EXAMPLES⁵⁰

India

In India, women's representation in the technical fields is growing. India's ICT sector plays a pivotal role in bridging the gender divide in the country's workforce by helping to overcome biases against women and girls, especially those from rural or uneducated backgrounds. With women comprising 31 per cent of the ICT workforce in 2009, the Indian ICT sector has achieved one of the highest gender ratios in the region. Girls and women are encouraged to take up training courses in computer and ICT engineering.

Republic of Korea

The Republic of Korea's Women in Science and Technology policy was implemented between 2004 and 2008. The 2nd Basic Plan (2009–2013), currently being implemented, includes establishing one national and four regional organizations under the umbrella title of the Institute for Supporting Women in Science and Technology. The Act on the Promotion of the Economic Activities of Career-Break Women was enacted in response to a 2008 report that the participation rate of women aged over 30 years in economic activity was very low.

Philippines

The Philippines is another important ICT player in Asia, and women account for about 65 per cent of the total professional and technical workers in IT services and IT enabled services.

Russian Federation

In the Russian Federation, women are in a minority in the ICT sector. Directing young talent to the sciences and ICT is being supported by the government, companies and academic institutions through such programmes as Step into the Future, which is funded by the Russian Government and championed by its president. The few programmes that specifically target women in the ICT sector are offered by international corporations such as Microsoft and Cisco, or by international non-governmental organizations (for example, the IREX Tech Age Girls programme).

Argentina

In Argentina some 30 per cent of the students in technical secondary schools are girls. Whether they will pursue related university degrees and hold technical jobs in companies or the government remains to be seen. The IT jobs that women tend to do are simple, such as ordering merchandise and recording inventory using a computer, or receiving orders via the Internet for home delivery of

⁵⁰<https://itunews.itu.int/en/>

food. It remains a challenge to turn these experiences into a launching pad to establish women in the more sophisticated and better paying ICT-driven jobs.

Canada

In Canada, the Centre for Education in Mathematics and Computing (CEMC) workshop in computer science targets women aged 15–16 years. The programme is designed to ignite enthusiasm for computer science in interested female students from across Canada. Young women learn that computer science is about much more than using and programming computers. Through lectures, labs and hands-on activities, the workshop explores the foundations and applications of computer science that have a profound effect on the world today. To attract young women, the programme also advertises other benefits, including the opportunity to make lasting friendships and enjoy social events.

The United States

A study in the United States found that today's generation of college-bound females appear to be less interested in computing than their male counterparts. The University of Illinois has an annual week-long camp, designed to give academically talented high school aged girls an opportunity to explore exciting engineering and scientific fields through demonstrations, classroom presentations, hands-on activities, and contacts with women in these technical fields. The aim is to promote positive attitudes to mathematics and science among young students.

France

The trends of equal access to training and career orientation in addition to developing gender-friendly management practices are very actual in France. 35 per cent of management at all levels are females. France recognized the need to make sure that there is a gender mix, beginning with the recruitment process. This is particularly critical for technical jobs, since there is competition with the whole industry to attract a scarce number of female graduates of technical studies. In that aim, it is necessary to set up partnerships with engineering schools so as to promote career opportunities to young women, but also to work together towards bringing more girls into science classes.

Germany

Deutsche Telekom, Germany's leading telecommunication company has declared that 30 per cent of its middle and upper management jobs will be filled by women by 2015. Women made up 30 per cent of Deutsche Telekom's staff and 13 per cent of the company's top managers when the policy was introduced in 2011.

ABBREVIATIONS

BOŠ	Beogradska otvorena škola
BSR	Zemlje regiona Baltičkog mora
CCNA	Cisco Certified Network Associate
CEDAW	UN Committee on the Elimination of Discrimination Against Women
CSO	Civil society organisation
DIS	Društvo za informatiku Srbije
ECWT	European Centre for Women and Technology
EF	Elektronski fakultet
ENISA	European Union Agency for Network and Information Security
ETF	Elektrotehnički fakultet
EU	Evropska unija
Eurostat	Statistical Office of the European Union
FON	Fakultet organizacionih nauka
FTN	Fakultet tehničkih nauka
BDP	Bruto domaći proizvod
GEM	Gender Equality&Mainstreaming
GENOVATE	Transforming organizational culture for gender equality in research and innovation
HR	Human resource
ICT	Information and communications technology
IKT	Informaciono-komunikacione tehnologije
IT	Informacione tehnologije
ITU	International Telecommunications Union
JIVE	Joint Interventions
makeITfair	Production of Next-Generation Electronics in Poland –
MF UN	Mašinski fakultet Univerziteta u Nišu
MSCE	Microsoft Certified Systems Engineer

NAP	Nacionalni akcioni plan
NAPZ	Nacionalni akcioni plan zapošljavanja
NZS	Nacionalna sluzba za zapošljavanje
OCD	Organizacije civilnog društva
OECD	The Organisation for Economic Co-operation and Development
PP	Power Point
PR	Public relations
PRITK	Skala percepcije rodne IT kompetentnosti
RATEL	Republička agencija za elektronske komunikacije
RRA	Republička radiodifuzna agencija
RZS	Republički zavod za statistiku
SIDA	Swedish International Development Agency
SORS	Statistical Office of Republic of Serbia
TF UN	Tehnološki fakultet Leskovac Univerziteta u Nišu
TG MP	Tehnički fakultet Mihajlo Pupin
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WomenIT	Women in Industry and Technology” project
WSIS	World Summit on Information Society