

**PREDUSLOV ZA RAST:
KORIŠĆENJE ICT U SEKUNDARNOM OBRAZOVANJU U BiH
PREREQUISITE FOR GROWTH:
ICT USAGE IN SECONDARY EDUCATION IN BiH**

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Sadržaj – *Ovaj rad istražuje potencijalni rast upotrebe informaciono komunikacionih tehnologija i doprinos ekonomskom razvoju ispitujući načine sekundarnog obrazovanja u oblasti ICT koje je trenutno dostupno. Do sada ne postoji značajno istraživanje uticaja informacionih tehnologija ili nivoa njihovog korišćenja u BiH. Veoma je važno, međutim, razumjeti situaciju zbog neophodnih investicija koje treba da uslijede na ovim prostorima. Istraživanje teži da otkrije neke od razloga sporog razvoja informatičkog sektora u BiH (u poređenju sa okruženjem), a dugoročni cilj je i predlaganje solucija za neke od problema u ovoj tematici.*

Abstract – *This paper examines the potential growth of ICT use and contribution to economic development by examining the type of secondary education in ICT that is currently available. The education of the population is a critical contributing factor to the potential adoption and use of ICT. There has been no significant research done on the impact of IT or the extent of use of IT in B&H. It is essential, however, to understand the situation for much-needed investment activities to occur. This research can uncover some of the reasons for the slow development of the information sector in B&H and a long-term goal is to propose solutions for some of these issues.*

Ključne riječi – *informacione tehnologije, informatički sektor, istraživanje, obrazovanje, društvo*
Keywords – *information technology, information sector, research, education, society*

1. INTRODUCTION

Information and communication technologies (ICT) and the related infrastructure, trained workforce, and appropriate strategies are essential to successful participation in the world economy today. Some parts of the world have not made the transition from agricultural or industrial economies to information economies, and this slows their economic growth and limits their potential for participation in networks of information-sharing and/or commercial activity.

Bosnia and Herzegovina (BiH), a country formed in 1995 as a result of the Dayton Peace Accord which ended the war between various ethnic factions in the former Yugoslavia, is one area that has fallen behind in ICT adoption and use. This can be attributed to the disruption of the economy from the period of 1991 to 1995, which included massive migrations of people and the destruction of the industrial capability of the country.

BiH currently has one of the lowest average income levels and usage of ICT in Europe, yet the relative price of Internet access is high. Internet use is fairly low in the population overall, but much higher in the secondary and higher education levels.


This paper examines the potential growth of ICT use and contribution to economic development by examining the type of secondary education in ICT that is currently available. The education of the population is a critical contributing factor to the potential adoption and use of ICT.

2. BACKGROUND

From the Dayton Peace Accord, in 1995 Bosnia and Herzegovina was organized as a country consisting of two entities: the Republic of Srpska and the Federation of Bosnia and Herzegovina, as well as Brcko District. The Republic of Srpska is populated primarily by ethnic Serbians. The majority of the Muslim population resides in the Federation. The Brcko district is the neutral zone, where governing is shared by the three ethnic groups: Serbian, Muslim, and Croatian. The Federation and the Republic of Srpska each has its own governing structure including organizing bodies for education. However, there is a third, overarching structure at the country level.

The GDP (Gross Domestic Product) of Bosnia and Herzegovina is expected to be approximately 13 billion EUR in 2009. Whereas there was fast growth in the last few years, it is expected to slow due to the impact of the global economic crisis. The past growth rate, and expectation for the current year are shown in Table 1.

Table 1 - GDP real growth rate of BiH [1]



The GDP per capita is under 3,500 EUR and average net wages per month are 400 EUR. However, on average, a single household consisting of four members needs two average salaries or approximately 800 EUR for monthly needs (food, heating, rent and other living expenses).

The currency, the Konvertibilna Marka (KM) is tied to the Euro. (1 EUR = 1.955 KM; 1 KM = 0.5115 EUR.) This makes the currency relatively stable. The rate of inflation has ranged between 4% and 6% since 2006, but is expected to be only 3% in 2009. Unemployment is a more serious concern in BiH. Whereas the rate of unemployment has decreased from 43% in 2004 to 26% in 2009, this rate is still quite high. It should be noted, however, that these figures do not reflect employment in the 'gray market' economy in which services may be exchanged for goods or other services, or other unrecorded transactions take place.

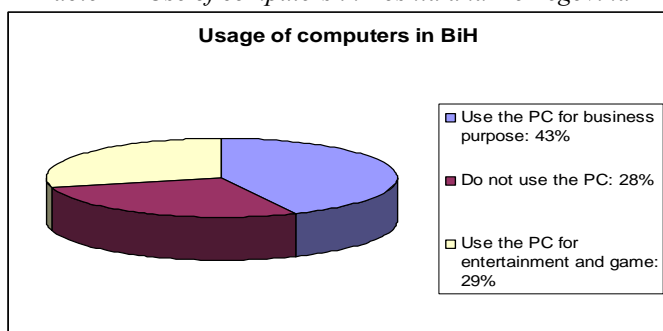
The most recent official census, conducted in 1991, reported a total population of 4,377,033. Between that time and 2008 it is estimated that the population decreased by approximately 500,000, or almost 11% of the total.

3. TECHNOLOGICAL ENVIRONMENT

The development of the information economy, telecommunications and IT technologies in Bosnia and Herzegovina stopped during the war period, at the time of great ICT expansion across the world. According to data collected by the World Economic Forum, Bosnia and Herzegovina is ranked number 89 out of 122 countries in the use of Information and Communication Technologies (ICT). Among the Southeastern European countries only Albania and Moldova are lower ranked. According to the majority of the indicators published by the World Economic Forum regarding ICT, Bosnia and Herzegovina is at bottom of the scale. On the absorption of technology indicator, BiH ranks in last place.

The following illustration (Table 2) shows the level of the computer use in Bosnia and Herzegovina, where 43% of the respondents use computers for business activities, 28% do not use computers at all, and the remaining 29% uses computers only for gaming.

Table 2 – Use of computers in Bosnia and Herzegovina



There are over 250 companies in Bosnia and Herzegovina which operate in the ICT industry. The majority (approximately 95%) of these businesses operate only in the Bosnia-Herzegovinian market. Table 3 shows the activities in the domain of ICT common for Bosnia and Herzegovina and

the number of companies operating in this area. Table 4 shows the export-import ratio of ICT goods in the period between 2006 and 2008.

Table 3 – Number of companies in Bosnia and Herzegovina with activities in the field of ICT

Activities	Number of companies
Production of computers and other equipment for data processing	Over 50
Production of segregated wires and cables	4
Production of electric pipes and other electronic components	6
Production of mono-static devices for telephone and telegraphy	14
Production of TV and Radio and ancillary equipment	4
Production of equipment for the control of industrial processes	5
Telecommunications	Over 25
Renting of office machinery, equipment, and computers	4
Giving tips on computer equipment	Over 25
Data processing	Over 20
Design and management of databases	Over 20
Other computer related activities	Over 20

Table 4 – View of imports and exports of ICT equipment in KM

Year	Export	Import
2006	1,600,000	112,000,000
2007	1,780,000	116,300,000
2008 (first quarter)	425,000	27,000,000

Investments in ICT are much smaller in BiH than those of other countries. Neighboring Croatia, which has the regional lead in the development of Information Technologies, invested 925 million KM into this field in 2006, whereas Bosnia and Herzegovina, with a slightly smaller population, invested only 110 million KM.

With an Information Technology consumption rate of \$42 per inhabitant last year, Bosnia and Herzegovina reached only 4.6% of the average EU consumption. Bosnia was far behind other countries in the region, such as: Slovenia (\$455), Croatia (\$275) and Serbia (\$103).

Whereas the use of the Internet has grown from 14% of the population in 2005 to 35% in 2008, this rate is still quite low. The average age of Internet users in BiH is 27 years, which is consistent with similar figures worldwide. The average Internet user in BiH has been using the Internet for approximately two years. The most common use is to browse libraries. There is little e-commerce.

4. USE OF ICT IN SECONDARY EDUCATION

Data was collected using two methods: short surveys of students and interviews with teachers and administrators. The surveys addressed the amount and type of computer use in education and the availability of computers and the Internet at home. The interviews addressed broader issues of the use of ICT in secondary education.

Data was collected from three different types of high schools: gymnasium, technical school, and general high school.

Table 5 – Frequency of surveys by school type

School	Frequency	Percent
Gymnasium	79	35.0
Technical school	74	32.7
High school	73	32.3
Total	226	100.0

Answers frequency for high school (secondary education) does not vary a lot in compare to primary school. Computers are still mainly used for teaching informatics and for acquiring the basic computer skills. Some courses on application of computers do exist, but only small percent. There were not any answers saying that computers were used in other subjects than informatics.

Table 7 – Secondary School Computer Use Amount and Type

	Frequency	Percent
just for informatics	140	61.9
applied computing	36	15.9
are used	40	17.7
are used, but very little	6	2.7
no answer	4	1.8
Total	226	100.0

From the chart it is visible that most of the students got their computers in the last 8 years. That means that before the year 2000 not a lot of kids had computers at home. The number of students that do not have computer is still very big (around 10 percent). Internet connection could be a good parameter to show the state of the ICT in B&H. It is clearly visible from the frequency of answers on this question that a lot of students (even if they have computers) don't have internet at home. Most of them who do have internet at home got the connection in the last year (~25%). This parameter shows that internet is becoming more affordable and cheaper, and that the students are using it more and more.

Table 8 – Do you have computer at home, and for how long?

	Frequency	Percent
< 2 years	30	13.3
2-5 years	65	28.8
5-8 years	69	30.5
> 8 years	38	16.8
no computer	21	9.3
no answer	3	1.3
Total	226	100.0

Table 9 – Do you have internet connection at home, and for how long?

	Frequency	Percent
< 1 year	58	25.7
1-2 years	9	4.0
2-4 years	34	15.0
> 4 years	27	11.9
no internet	96	42.5
n/a	2	,9
Total	226	100,0

The general conclusion derived from the interviews with the teachers, both teachers of informatics and teachers of other subjects, was that the ICT education in secondary schools should be modernized. A high percentage of the teachers would like to use computers in classes, but they do not have a chance to do that because of the lack of equipment. Teachers would like to use computers for presentations, educational movies, producing diagrams, and other activities.

There are also some legacy programs regarding informatics education. Plans and programs are obsolete. Another problem is that literature is quite poor and unsynchronized with the program. A comparative analysis of the level of ICT education between the types of high schools showed that the gymnasium was the most advanced. The most probable reason for the better results there is the experimental program and donation from Japanese government.

External agencies are frequently the source of hardware and software. Some secondary-level computer laboratories in BiH were furnished with computing equipment left behind by various military forces (KFOR, etc.). Other external agencies provide software and teaching programs along with hardware. Unfortunately the staffing to support these labs is not provided, and it is not unusual for the computer labs to be underutilized due to lack of training or knowledge regarding maintenance and support.

5. ANALYSIS

From the data collected regarding computer use in secondary education in Bosnia and Herzegovina we see that ICT education is primarily of a very general nature. Few students have had computers with Internet access at home for very long. Whereas there was no data available in the same format from Western countries for comparison, it is clear that ICT education is at a fairly low level.

With only the most basic understanding of how to apply computers and other ICTs to their work and daily lives, students leaving secondary school are ill-prepared to become sophisticated users (or developers) of ICT in the workplace.

Without an educated workforce, it cannot be expected that the information economy will grow at a very rapid pace.

The lack of educated workforce can also limit the number of external investors who are interested in opening a business

that would require anything more than agricultural or manufacturing workers.

A comprehensive update in the educational system in BiH with a focus on practical ICT training is necessary. The number of students with access to computers and the Internet is growing, and their capability to do more with the computers will grow. The need for better trained teachers is obvious now, and the need will grow in the future.

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