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DIGITAL SKILLS READINESS OF SELECTED WESTERN BALKAN COUNTRIES

Abstract:

The latest technological developments have subsequently impacted businesses imposing changes to the methods of production and the patterns of employment. Businesses are becoming heavily depended on new technologies and strive to invest in latest technology so as to leverage it in increasing productivity and innovation. To capitalize on the opportunities that have been created with the high-tech solutions, businesses require digitally skilled workers who can use advanced technology in daily business operations. Since advance technology has dispersed across many industries and occupations, the demand for digital skills has dramatically increased in most sectors of the economy. Many emerging jobs involve work activities that require a complementary skillset of advanced digital skills, problem-solving and technical skills, and entrepreneurial or business skills. Developing the required skills for the digital age in the region leaves much to be desired. The curricula in education institutions should be revised, modern teaching methods should be introduced and critical thinking, creativity and problem solving should be encouraged among students. Using a set of digital tools in formal education as an integral part of the learning process will foster digital skills excellence among future workers.

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Introduction

Nowadays, digitization impacts almost every sector of the economy. The advent of the digital transformation was reflected in the first computer revolution in the 60s, enabling task automation and process standardization, followed by the second information and communication technology (ICT) revolution in regards to companies using the Internet as a standard channel of communication and a way of doing business. Nevertheless, the last two decades have witnessed radical changes known as the third ICT revolution, which have introduced the full potential of digital revolution and the phenomenon of Digital Economy. The latest technological developments meant 'digitization of everything' and have subsequently impacted businesses imposing changes to the methods of production and the patterns of employment. Digital Economy basically refers to how digital technologies are used to promote the existing economy, in a direct way, through the emergence and development of new digital ICT industries, or in an indirect way, through development of new businesses and introducing efficiencies to traditional ones.

Web solutions for e-commerce, customer relationship management applications, enterprise resource planning, supply chain management and cloud computing services have changed the patterns of doing business and initiated the process of business transformation. This, in turn, has urged enterprises to adjust to new circumstances and strive to benefit from the advantages of the digital world putting digital upgrading as a key priority for most companies. To capitalize on the opportunities that have been created with the high-tech solutions, businesses require digitally skilled workers who can use advanced technology in daily business operations. Since advance technology has dispersed across many industries and occupations, the demand for digital skills has dramatically increased in most sectors of the economy. Many emerging jobs involve work activities that require a complementary skillset of advanced digital skills, problem-solving and technical skills, and entrepreneurial or business skills.

A significant shortage of digital professionals in Europe is anticipated by Empirica,[1] which could result with 756,000 unfilled vacancies in ICT jobs by 2020, out of which 530,000 potential additional jobs in ICT practitioner occupations and around 226,000 at ICT management level.[2] Data analytics as a required skill for the digital age is regarded as key to driving business innovation through the use of high-tech solutions. Yet, these skills are in shortage among managers. Recent Harvard Business Review survey revealed that although 73% of surveyed executive and senior managers stated that data analytics was extremely important to their business, yet, only one in five reported having high skills in this area.[3]

The digital technology advancements will continue to transform business practices and processes and change the job requirements in many industries, subsequently imposing a need to digitally upskill the workforce. The national economic productivity and ability for innovation largely depends on the cross-functional skillsets of its workforce. Thus, 'digital age' skillsets that entail a mix of digital, technical, entrepreneurial and other complementary skills is considered to be a key objective of most economies. In the global pursuit of becoming 'digital economy', the countries in the Western Balkans should put every effort in developing adequate national policies and state-of-the-art education and training curricula to overcome the digital skills gap.

1 DIGITAL SKILLS CLASSIFICATION

The increasing use of ICT at work and the digital transformation of businesses have imposed demands for new skills among the workforce. The job profiles that have emerged in the recent years require high diversity of workers skills to make them competitive in the rapidly changing business environment. Thus, with the advent of advanced digital technology and its immense application in businesses and the society, countries have put every effort in developing themselves as a digital economy in order to be globally competitive in the 21st

[1] Hüsing, T., Korte, W.B., Dashja, E: "E-Skills in Europe - Trends and Forecasts for the European ICT Professional and Digital Leadership Labour Markets", Empirica, Working Paper, 2015

[2] This 'job potential' for ICT jobs describes the demand potential for new ICT jobs which could be created in Europe due to an e-skills demand which is likely to occur especially in the years closer to 2020.

[3] Harvard Business Review: "Driving digital transformation: New skills for leaders, new role for the CIO", Harvard Business Review Analytic Services Report, 2015

century. The above has changed the skills that are anticipated to be essential in the following years. Based on the workforce skills that would be required in the digital age, several skills frameworks have been developed.

In this context, OECD, International Data Corporation (IDC) and the European e-Skills Forum offer a framework on required skills for the digital age, presented in Figure 1. Generally, these frameworks suggest three categories of skills that are required for digital economy development. The OECD framework includes *generic ICT skills*, skills that enable workers to successfully use digital technologies in their work activities such as accessing information, using software programs, *ICT specialist skills*, required to produce and manage ICT products and services such as developing software programs, applications and managing ICT networks, and *ICT complementary skills*, skills that are required to accomplish complex high-tech business activities.[4] Three levels of skills are also present in IDC[5] and the European e-Skills Forum[6] classification of skills. The latter distinguishes between user, practitioner and e-business skills, encompassing similar skills requirements for different job profiles. According to these classifications, basic digital literacy and some ICT skills will be required for a variety of non ICT jobs, advanced ICT skills and some business skills, especially regarding the role of ICT in business, are required for ICT professional jobs, while a set of advanced ICT skills and business skills are required for digital economy development, since e-business skills are strategic and are related to innovation management and entrepreneurship. The expectations are that all three types of skills will increase in importance in the following years.

[4] OECD: "New skills for the digital economy: Measuring the demand and supply of ICT skills at work", OECD Digital Economy Papers, No. 258, 2016

5 Kolding, M., Robinson, C., Ahorlu, M: "Post Crisis: e-Skills Are Needed to Drive Europe's Innovation Society", IDC, 2009

[6] The European E-Skills Forum: "E-Skills for Europe: Towards 2010 and beyond", Synthesis Report, 2004

Figure 1. Skills classification frameworks

OECD classification	International Data Corporation (IDC) Classification	European e-Skills Forum classification
• ***Generic ICT skills***: skills required for successful use of digital technologies at the workplace • ***ICT specialist skills***: skills required to develop and manage ICT products and services • ***ICT complementary skills***: skills required to accomplish high-tech business activities	• ***Basic ICT skills***: skills required for non-ICT professional job roles for use of technology-driven devices • ***Advanced ICT skills***: skills required for ICT professional job roles • ***Digital Innovation skills***: skills required for "innovation professional" job roles, necessary to develop knowledge society	• ***User skills***: skills required to use ICT as tools at the workplace • ***Practicioner's skills***: skills required to develop, design, install, and manage ICT systems mainly in the ICT sector • ***E-Business skills***: both ICT and management skills, that enables professionals to adapt businesses and organizations to accommodate ICT technology and exploit opportunities provided by digital technology

Source: Adapted from OECD, International Data Corporation and European E-Skills Forum

A most comprehensive skills framework has been developed by the Information and Communications Technology Council (ICTC). According to this framework digital entrepreneurial skills are the highest level of skills required for digital economy development.[7] The skills of the digital economy are categorized in three functional levels: foundational/business/interpersonal, technical and entrepreneurial skills. In this regard, foundational skills have to be complemented by strong business and interpersonal skills; technical skills are critical for production processes and service delivery; and finally, a set of advanced technical and entrepreneurial skills required for the digital economy and management of digital technologies. High skilled jobs require a complementary skillset of advanced digital skills and business and entrepreneurial skills, es-

[7] Asliturk, E., Cameron, A., Faisal, S: "Skills in the digital economy: Where Canada stands and the way forward", The Information and Communications Technology Council (ICTC), 2016

pecially in management positions.[8] Workforce that possesses both digital and entrepreneurial skills will be able to carry out work in a technology-rich environment and seize the opportunities derived from technology advancements for business innovation purposes. Competitive workforce easily deploys skills required for innovations as creativity, strategic thinking, risk-taking, ability to evaluate different scenarios, networking and business skills to maximize opportunities and increase the value of the enterprise. However, being competitive in a digital economy requires deployment of existing digital technologies as an integral part of business processes or developing new digital innovations. In other words, businesses and economies should either capitalize on the advanced digital technologies (as e-commerce, data analytics, cloud computing) in their everyday operations or develop R&D technological innovations into products or services.

2 ICT DEVELOPMENT IN SELECTED WESTERN BALKAN COUNTRIES

The development of the IT markets on a national level as well as the level of digitalization of the countries can be assessed using the Networked Readiness Index (NRI),[9] one of the key indicators for evaluation of economies' digital development i.e. the capacity of countries to leverage the ICT for competitiveness and wellbeing. This index comprises of four main categories (sub-indices), 10 subcategories (pillars) and 53 individual indicators across different pillars. The NRI assesses whether countries possess the drivers necessary to use the full potential of digital technologies and whether these technologies have impact on the economy and the society. The drivers are grouped into three sub-indices:

A. Environmental sub-index

1. Political and regulatory environment (9 indicators)
2. Business and innovation environment (9 indicators)

[8] European Commission: "E-skills and ICT professionalism: Fostering the ICT profession in Europe", The Innovation Value Institute & Council of European Professional Informatics Societies for the European Commission, 2012

[9] As of 2001, The World Economic Forum started the Networked Readiness Index to assess the influence of ICT on business activities on a national level and provide recommendations to policy makers in order to improve existing ICT performances.

B. Readiness sub-index

3. Infrastructure (4 indicators)
4. Affordability (3 indicators)
5. Skills (4 indicators)

C. Usage sub-index

6. Individual usage (7 indicators)
7. Business usage (6 indicators)
8. Government usage (3 indicators)

D. Impact sub-index[10]

9. Economic impact (4 indicators)
10. Social impact (4 indicators)

Thus, the NRI was used to analyze the differences in the development of ICT in the countries from the region. Table 1 presents the ranking of several countries from the Balkans in the last three consecutive years. Slovenia takes the leading role in the region as a country that has highest level of ICT development and impact on business activities with 4.7 index for 2016. Macedonia also reports relatively high overall NRI of 4.4 in comparison to other countries from the region. According to individual sub-indices, Macedonia is in the first place among SEE-6 countries in Political and regulatory environment and Business and innovation environment. It is worth mentioning that Macedonia is the best ranked in the world according to 3 indicators: Time required for starting a business, Number of procedures required to start a business and Internet and telephony sectors competition index. Macedonia shows particular results according to the values of the following indicators: Mobile network coverage rate, Adult literacy rate, Use of virtual social networks, Intensity of local competition and Total tax rate. The remaining countries have similar results of NR Index. For example, NR Index of Croatia and Montenegro is 4.3, Serbia with 4.0 and Albania with the lowest NRI value of 3.9.

[10] The impact is measured as a separate sub-index

Table 1. Networked Readiness Index, 2014, 2015, 2016

Country	Rank - 2014	Rank - 2015	Rank - 2016	NR Index -2016
Montenegro	52	56	51	4.3
Serbia	80	77	75	4.0
Croatia	46	54	54	4.3
Bulgaria	73	73	69	4.1
Greece	74	66	70	4.1
Slovenia	36	37	37	4.7
Albania	95	92	84	3.9
Macedonia	57	47	46	4.4

Source: World Economic Forum, 2016

To evaluate the level of skills acquisition that is essential for digital development of an economy, the Skills pillar is also presented in Table 2. The Skills pillar, part of the Readiness sub-index of NRI, is a composite indicator of skills that measures the ability of a society to make an effective use of ICT as a result of the existence of basic educational skills generated from the quality of the educational system, quality of math and science education, the level of adult literacy and the rate of secondary education enrolment. Again, Slovenia reports highest value of the skills pillar. Although Albania reports lowest NRI value in the region, yet it ranks high in terms of skills necessary for digital development. Macedonia, however, lacks behind all other countries in the region in terms of the criteria encompassed in this indicator. The above would imply that the country cannot or does not have the capacity to effectively use ICT due to insufficient or inadequate knowledge.

Table 2. NRI Skills pillar, 2016

Country	Rank – 2016 (out of 139)	Skills Pillar - 2016
Slovenia	21	5.8
Albania	29	5.7
Croatia	42	5.5
Montenegro	50	5.4
Bulgaria	52	5.4
Greece	58	5.3
Serbia	61	5.2
Macedonia	66	5.1

Source: World Economic Forum, 2016

Additional analysis of the Skills pillar reveals a more detailed picture on the main individual indicators that restrain the use of the full potential of the digital development. Table 3 presents the values for all four indicators that constitute the fifth Skills pillar.

Table 3. NRI Skills pillar indicators for Western Balkan countries, 2016

	Indicators	Macedonia	Slovenia	Croatia	Montenegro	Serbia	Albania	Bulgaria	Average	(Max-Min)/Max	World Best Value (WBV)	|WBV-SEE6AV|/WBV
Skills	5.01 Quality of the education system	3.8	4.1	3.1	3.9	3.1	4.1	3.4	3.64	24%	6.1	40%
	5.02 Quality of math and science education	4.3	5.3	4.8	4.6	4.4	4.3	4.3	4.57	19%	6.4	29%
Pillar	5.03 Secondary education enrollment rate	82	97.6	99.8	90.3	94.3	82.4	93.1	91.36	18%	163.1	44%
	5.04 Adult literacy rate	97.8	99.7	99.3	98.7	98.1	97.6	98.4	98.51	2%	99.9	1%

Source: World Economic Forum (WEF), 2016

Based on the WEF data presented in Table 3, Croatia, Bulgaria and Serbia reveal rather low score on the overall quality of the education system, while Macedonia and Montenegro lag slightly behind the leading country in the region – Slovenia. However, quality of math and science education is significantly lower for Macedonia than it is for Croatia and Slovenia. Indeed, Macedonia, Bulgaria and Albania should focus on improving the quality of math and science education, as they are the basis for fostering digital and analytic skills among students. Macedonia is also at the bottom of the ranking in the region with regards to secondary education enrollment and adult literacy rate. Hence, one of the priorities on a national level should be developing policies to tackle the weaknesses in the education system and develop workforce skills that are considered essential for the new digital age workers.

3 SKILLS ACQUISITION FOR THE DIGITAL AGE

A competitive worker in the digital age labor market is the one who can easily utilize advanced digital skills in a way that would add value to the organization. Therefore, countries are introducing curricula aimed at strengthening digital skills among students, upgrading math and science knowledge of students, developing analytical and critical thinking skills, as well as competencies for problem solving. These curricula are built on interdisciplinary courses and problem-solving projects so as to foster students to apply the knowledge they have acquired. In addition, extensive informal training is encouraged to upgrade workers skills and to keep pace with the fast-growing technology advancements.

As the digital transformation of businesses moves at a fast pace, the pressure on workers to excel at digital skills increases. Having in mind the above mentioned classifications of necessary skills for the digital age, several underlying competences become main pillar of the' knowledge of the future': critical thinking, problem solving, technical and analytic skills, creativity and entrepreneurial skills, along with the digital skills. Although formal and informal training are paramount to workforce up-skilling, yet recent Eurostat data suggest that formal schooling remains the main way of digital skills acquisition among workers. "Taking a more holistic perspective, infusing the curricula with digital learning from the earliest stages of formalized schooling through-

out higher education…"[11] is an undisputable standpoint. Nevertheless, many Western Balkan countries still lag behind, in comparison to leading countries in the world, with regards to introducing curricula or teaching methods that would increase science and math knowledge among students, or develop analytic and digital skills. In this context, the last PISA testing scores are devastating for some countries in the region. The last PISA 2015 testing among 15-year old students includes data from 72 countries and economies, including all 35 OECD members and 37 other countries and economies. The results, presented in Table 4, reveal that Slovenia is a top performer in the region with a mean score above the OECD average. On the other hand, Macedonia falls behind every other country in the region. Even more, the mean score of this country in all three indicators is one of the lowest among PISA participating countries. A solid knowledge in math is a baseline for developing analytic skills, one of the requirements of the digital age. Montenegro, Albania and mostly Macedonia should definitely focus in the upcoming years on revising the math courses before considering the introduction of analytic and digital skills in their curricula.

Table 4. PISA Testing scores, 2015

Selected countries	Science	Math	Reading
Singapore (top performer)	556	564	535
Japan (top performer)	538	532	516
OECD Average	493	490	493
Slovenia	513	510	505
Croatia	475	464	487
Bulgaria	446	441	432
Montenegro	411	418	427
Albania	427	413	405
Macedonia	384	371	352

Source: OECD, available at: https://www.oecd.org/pisa/ (10.08.2018)

[11] Berger, T., Frey, C.B: "Digitalization, jobs, and convergence in Europe: Strategies for closing the skills gap", European Commission DG Internal Market, Industry Entrepreneurship and SMEs, 2016

In line with the changing demands of skills acquisition, the last PISA testing also included examination on collaborative problem solving among students. Problem solving skills are considered to be essential for the competitiveness of the 'new millennium workers'. Indeed, many cutting-edge higher education institutions have developed curricula based on the concept of problem solving. On the other hand, most of the countries in the region had ones of the lowest mean scores in collaborative problem solving, including Croatia, Montenegro, Bulgaria, and, of course, Macedonia.

The above data clearly suggest that several countries in the region, especially R. Macedonia, should consider revising their school curricula as a national priority and include major changes in the predominantly traditional teaching methods. An attempt to introduce digital skills in classroom was made in Macedonia in the period 2003-2005 when 5300 PCs were obtained and installed in primary and secondary schools. In addition, several USAID funded projects as: Macedonia Connects project (2004-2007) - enabling broadband Internet access to be readily available throughout the country; E-Schools Project (2003-2008) - 460 computer labs with PRC computers in all primary and secondary schools; Primary Education Project (2006-2011) - improving the quality of instruction and increasing employment skills in youth; have been some of the efforts made to improve the digital skills among youth in the Republic of Macedonia.[12] And, although some of these projects have been successful, others have failed to provide the anticipated results. For example, installed PCs in primary and secondary schools did not significantly increase the use of digital tools in classroom, as schools continuously face difficulties in their maintenance and many of the teachers do not use them in class at all.

In this context, not only that the countries in the region should focus on fostering required skills among students in primary and secondary education, but should also work on initiating and implementing professional development of teachers. For example, Finland as one of the high performers in education has not only stringent selection of teachers but it also introduces continuous professional development of teachers. Contrary to this, most of the countries in the region had only an insignificant share of teachers who had attended a program of professional development in the three months prior to the PISA test. In particular, R. Macedonia holds the last 69th rank.

[12] Jancevski, M., "ICT and Educational software in Macedonian schools", Sixth International Conference for Informatics and Information Technology, 2008

Developing the required skills for the digital age in the region leaves much to be desired. Not only that curricula in all three levels of education (primary, secondary and tertiary) should be revised, but also modern teaching methods should be introduced. In addition, critical thinking, creativity and problem solving should be encouraged among students mainly through adequately developed interdisciplinary project-oriented courses. Additionally, the use of digital tools by both teachers and students should be a primary mechanism of teaching. Using a set of digital tools in formal education as an integral part of the learning process will foster digital skills excellence among future workers.

Conclusion

The digital era has triggered economies worldwide to strive and develop their workforce competences and skills in order to ensure the economic prosperity of the country. Most of the countries in the region, however, should invest more resources and efforts to increase their workforce skills to match the new demands of the labor markets. The 'digital age' workforce should possess a unique skillset of digital, business, analytical and creativity skills. The economic prosperity of countries depends not only on the level of digital development, but even more on the ability of the workforce to use advanced digital technology for innovations and sustainable competitiveness of business and the economy.

Among the key challenges ahead of most countries in the Western Balkans is developing education and training systems in line with the new skills demands. Thus, joint efforts of government bodies, higher education institutions and training providers should be aligned to develop workforce skills required to initiate and achieve digital transformation across companies and industries and hence ensure their economic prosperity. Continuous learning and tailor-made training programs on digital and business skills should become prerequisite for leveraging skills and sustaining workforce competitiveness and economic growth.

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